ANUMUKTI

A Journal Devoted to Non-Nuclear India

Volume 5 Number 1 August/September 1991

# Living Without Hope in Dungardih

It was hot and humid. Typical monsoon weather, but there had been no showers. After the long walk I was feeling very thirsty. In the distance was a farmer taking out young rice saplings for later transplantation. "Could I have a drink of water?" I asked. "You will have to go to my home," he answered. "Anyway, I am almost through here, come on, lets go."

We walked down the side of a large pond. Almost a lake. Lovely lush green scenery, There were some cattle grazing the grass growing on the banks of the pond at one end. "You can't drink the water of this pond. It is poisonous, gives you T.B. if you drink it. It is lucky that you have come here after the rains. During the summer the water dries up and the dust blows in the hot winds. It is terrible. One feels thirst all the time. Also it is very painful."

Just by the side of the pond is a small village. Some twenty, twenty five houses. I find that its name is Dungardih. I spy a well and advance towards it. "No! no. Don't drink water from there. That is also poisonous. The only water you can drink here is tap water supplied by the company (Uranium Corporation of India Ltd)."

"What about your animals? What water do they drink?" I enquire. "What can the poor creatures do? They drink the poisonous water from the pond."

Most of the men have gone to work. Work out here means employment with the company, either in the various mines or in the mill where the uranium ore is crushed and treated and converted to 'yellowcake'. Farming is not considered as 'work. Only the "unfit" and the unemployed do it.

Some children are playing in a field. I join them. They all look very weak to me. Thin almost emaciated hands and legs. Sanatan Mardi better known by his nickname Daman, studies in the second standard. He has been born with no fingers on either of his legs or hands. His mother calls me over to her hut. "I have lost five children. They were very weak. All died within a few days of birth. My only hope and support is Daman."

A twenty-five year old youth Mohan from a neighbouring hut tells me, "I am 'unfit'. I worked for just three months. My younger brother still works in the mill. It is the air. That is what makes us unfit. My father died three years ago after being declared unfit"

"How do you know that your younger brother won't get unfit?" I asked. "Our health is bound to become bad. But what are we to do? One has to eat. We know that it is more dangerous to work in uranium mines than in other mines. Look at Ghasia Majhi. He has this tumour in his neck. And there is my neighbour HodingMajhi. Sitting for the last five years at home after being declared unfit. His toes have had to be amputated. He still had fourteen years of service left. But why look at this village alone. Go to any village where there are uranium mines-Bhatin, Surdha, Narua, Rakha, Bhusabani-everywhere you will find the same thing. Skin diseases, Pain in the stomach, T.B., cancer, pain in the joints, terrible weakness and pain-that is our lot."

"What about a hospital? Where do you go for treatment?" "There is a hospital run by the company just near the mill (at Jaduguda). But there is no government hospital. This one is only meant for the employees. Some local people also go there. But it is very expensive. Most of us go to the government hospital at Tatanagar (40 km away)."

In the morning I had taken a lift in a truck to get to Bhatin mines. True to Narayanbhai's description in the song (see page 3-Editor) it was an open truck which drove right underneath a loading shed. Loading was done by automatic loaders. You press a button and a huge load of broken rock descends from the roof into the truck. It does this trice before a truck is full. Sometimes small lumps of the ore fall by the side. The driver or his 'cleaner' just pick them up and toss them over into the truck. Nobody wears any gloves or protective clothing. I ask a worker about this.

"The company does give uniforms but we can't wash them everyday. Some leave them in the changing rooms while others take them home. Masks are available but not for everybody."

Next to the Bhatin mines is a tailings pond. Waste water from the mines and the mill after uranium extraction is poured here. There is no "security." Not even a barbed wire fence. The tailings have become hardened, like stone. I meet another youth walking nearby. He shows me around. He says, "Many people come here. We talk to them. We tell them our sorrows. They take photographs. They go away. But there is no change in our condition. Is anyone working for that? Can you do anything to change our miserable lot?

On my way back to Tatanagar I kept thinking of his words. They reminded me of one of Narayanbhai's songs:

*"There is a struggle going on today*
*between the forces of death and the*
*powers of life."*

The terrible situation faced by the poor Adivasis of Jaduguda-a situation not of their making-is a problem of survival for them. But is this a problem that they have to face and solve alone? Is it not a problem of the entire human race?

*"When will justice come to Athens ?"*
*They asked Thucydides.*
*And he answered,*
*"Justice will not come to Athens*
*until those who are not injured*
*are as indignant as those who are."*

*Suren Raut*
*Sampoorna Kranti Vidyalaya-*
*Vedchhi*

## From the Editor's

***Before we can talk about the bomb we have to talk about where the bomb comes from. It comes from the land, from the people. Before they build a bomb they have already destroyed the Indian people. They have destroyed their water and their fishing before they have destroyed people with the bomb. We have got to get to where it is happening, right here in the back yard of our own country.***

***Brian "Banjo" Ratt***

Recently I met Rajmohan Gandhi in Bombay. Glancing over a copy of *Anumukti* he exclaimed, "What! You have been bringing it out for such a longtime.

He probably meant that all that could have been said on the nuclear issue must have already been said and there was no point in stretching this harrangue any further. Needless to say that I don't agree with him, though I do feel that *Anumukti* ought to be in also Hindi and in other Indian languages for it to have any impact. All of us here at Vedchhi intend to make every effort to have a Hindi *Anumukti* out before the next year. The main bottleneck in achieving this is the absense of a computer at Vedchhi and if any of our readers has a computer to donate we would be most grateful.

I am in this wishes were horses mood because this is *Anumukti*'s 25th issue. We have decided to make it a special by focussing our attention on the root of the problem—the front end of the nuclear fuel cycle-the issue of uranium mining.

The mining issue is really three interlinked issues rolled into one.
The health problems of uranium miners and their families

- The contamination caused by the wastes generated during the milling process
- The disregard for the rights of the indigenous populations of uranium mining areas

Canada, U.S., Central Europe, France and French Africa, Namibia, Australia and South Africa are the major uranium producing areas of the world. India, fortunately does not have much uranium, though it has spent almost as much as the major producers in desperately exploring for ore.

Except for some high grade deposits found only in Canada, uranium ore usually contains only a few tenths of a percent uranium. All the rest of the rock is considered waste. Hence Uranium mines produce enormously huge quantities of waste known as 'tailings' Although the uranium extraction (milling) processes are able to remove almost 90% of the uranium they remove very little of the other radionuclides present. Thus tailings contain about 85% of the total radioactivity of the rock. The Jaduguda mines are specially bad since the quality of the ore being mined is probably the worst in the world. East German mines (where the uranium content was three times greater than that found at Jaduguda) were closed last year since they were hopelessly uneconomic. However, we not only continue to mine and mill at Jaduguda but are in the process of constructing another bigger mill nearby at Turamdih to process even worse quality ore. And the Uranium Corporation of India makes a profit. Such are the wonders of "self reliance" in the nuclear field.

Getting to know about the consequences of uranium mining from all over the world, only a single conclusion can be reached—the motto of the worldwide movement against uranium mining:

**LEAVE URANIUM IN THE GROUND**

# The Price Jaduguda Has Paid

*Go to the mines of Jaduguda*
*From where come the uranium loads*
*See how it is carried in open trucks,*
*and falls in middle of roads.*
*Go to the reactors of RAPP*
*How radiation has spread!*
*Look at the workers of Tarapur*
*How they have been mislead.*
*Very Frightening, very frightening, very frightening indeed*
*Is the Maya of atomic energy*

*Narayan Desai*

There was a time when Jaduguda used to be a place of scenic beauty. Dense green forests, low mountains, small villages surrounded by hills, hardworking people, playful and eversmiling children, open air, flowing streams; everything was once here!

But they had one more thing-uranium in the womb of mother Earth. Exploring man got to know of this. And then atomic man had to grab it at all costs. The bowels of the Earth were torn open and digging and ever more digging was done to get the uranium out. The hunger of nuclear reactors for uranium was satisfied but the people of neighbouring 1200 villages have become both hungry and naked.

People whose sustenance was the forest, became dispossessed. Jungles got destroyed, the hills became barren and the people became powerless.

## Prohibited Area

Fact about the uranium being in the ground was known in 1950s itself. But it was in 1967 that uranium mining and processing equipment came to the area. Along with the equipment, operating workers came, mining scientists came, officials came-all of them came from outside. Buildings were built, houses were built for them to stay. Those who had come without houses now had homes, but those who had ho,e and lived here for long, became homeless. Some went into distant hills, some to Naroana, some wandered around—they are wandering still.

This green self contained Adivasi (aboriginal) village in the Singbhum district of Bihar became part of the mainstream of development. Automobiles and vehicles started plying to and fro from Rakha Mines station to Jaduguda. The environment became smoke filled; clean Gura river became dirty-1200 villages were consumed and Jaduguda became an industrial township. Today this place provides the uranium for all the Indian reactors with the exception of Tarapur.

Those villages and people who refused to be displaced in the beginning are now slowly being squeezed out. Radioactive pollution is increasing rapidly. However, as yet, even after 24 years, there is no instrument to measure this pollution.

Waste water has spread far and wide. A population of nearly 5,500 people is suffering this water pollution. Chati Kocha, Rani Kocha, Dungardih, Lakhi, Talaitand and other villages are dependent on the waters of a lake which carries a signboard in English — **"Prohibited Area."** The villagers do not understand English but they do understand and know that when they breathe, drink and eat, the air they breathe, the water they drink and the food they eat are all poisonous.

## An Epidemic of Deformities

The village in the immediate vicinity of the tailing pond is Chati Kocha. A little farther is Rani Kocha. The total population of both these villages combined is around 500 of whom 100 are children. A survey found that two children are not able to see at all, six are able to see dimly, four are hearing impaired while eight are mentally retarded. Half the women complained of white discharge while 47% complained of early and frequent menses. In the last five years, eight women have given birth to deformed children who have died within a week of birth. In these five years there have been more than 30 spontaneous abortions. And all the women complain of fatigue, weakness and depression.

Half the men too complain of tiredness and depression. The amount of lymphocytes in the blood of 54 per cent of the people are quite high indicating a disposition towards cancer.

The condition of the children and the plant workers is terrible. Seven year old Manoj has both his legs turned outwards below the knees. He cannot walk properly. Eight year old Mani's left hand comes only till the elbow. Eight year old Shiv is a patient of thalesimia and requires frequent blood transfusions. Nine year old Tulsi also suffers from the same disease. Munna, who is twelve years old suffers from megacolon. He can neither speak, nor walk nor do anything with his hands.

Elders of the area say that earlier it wasn't like this. Those families which have had deformed babies had not seen a case of deformity for at least five generations. Thus, the general public opinion in the area feels that all these illnesses and deformities are due to uranium mining and processing.

## Official Claims

Uranium Corporation of India Ltd (UCIL) says that radioactivity is spreading very slowly and is well within internationally accepted "safe limits." According to officials, the amount of uranium found in the ore here is only 0.04 to 0.06 percent.

The waste remaining after uranium processing is taking from the mill through a long pipe to the tailing pond. This pond covers an area of 3.6 square kilometers. The pipe is broken in a number of places and the water keeps leaking. Adivasi women from surrounding villages use this water for all domestic purposes from drinking to bathing and cooking.

The administration officials claim that once uranium is extracted from the uranite, the remaining portion of the ores are not radioactive. The wastes contain only 0.005 milligrams per litre of uranium. Water after use is thrown into the Gura river which goes and meets Subarnarekha and tias the pollution from Jaduguda spreads all over Singbhum.

At the time of UCIL planning the planners had given a clear warning that the wastes should not be exposed untended and neither should they be released to the rivers. Till now the UCIL administration has been lying that the radioactivity posed no risk at all but now plans are afoot to set up an effluent treatment plant at the cost of Rupees One crore. This is being done after an investigation by central authorities and the International Committee for Radiological Protection. It is due to this pressure that attempts are now being made to separate the effluent waters from reaching the Subarnarekha.

## The Next Sacrificial Spot

A major deposit of uranium has been found at Domiasiat, 140 km south-west of Shillong in North-East India. It is claimed that the deposit is "the largest, richest, near-surface and low cost sandstone type uranium deposit discovered in India so far."

The ores are spread over a 10 square kilometer area at depths varying from 8 to 47 meters from the surface. Six layers of varying dimensions with grades up to 0.41 per cent uranium oxide have been delineated by drilling.

***Indian Express 13 August 1991***

## A Dump for Outside Waste

Radioactive waste from the Nuclear Fuel Complex at Hyderabad and the Variable Energy Cyclotron Centre at Calcutta is also dumped here in the pond. Earlier this waste used to be kept in Hyderabad, but in 1982 four workers died while working in midst of this waste. At the time there were strong protest from neighbouring residents against waste storage in the vicinity. It is only after that that this waste has started coming to this Adivasi area bearing its deathly sting.

While the UCIL management doesn't accept the fact that radioactivity has in any way been harmful to either people, animals, trees or plants, the high officials have made arrangements for their own food to come from a government farm some 44 kilometers away.

*Ms Manimala*
*Dharmayug 4 March, 1990.*
*(Translated from Hindi)*

# A Primer on Uranium Mining

- Why leave uranium in the ground?

No matter how uranium is mined, there will be radioactive contamination of the environment. Uranium deposits exist today because of their isolation from air and water over geological time scales. In its natural state, uranium, other radioactive materials, and heavy metals are in the form of solid rocks and therfore only tiny amounts if any can escape to the surrounding environment.

- Why are the products of uranium mining dangerous?

Uranium being radioactive keeps costantly changing into other substances, (uranium daughters) most of which are also radioactive. Thus, uranium contributes a very small percentage to the total radioactivity of the ore. After milling though most of the uranium is separated , more than 85% of the radioactivity of the ore lands up in the tailings. Since some of these daughters are especially long-lived, the tailings constitute a radiological hazard essentially for ever.

- **What are the most dangerous uranium 'daughters'?**

Radium-226 and Radon-222 are especially dangerous. Radium because it accumulates in the bone and is harmful to life-forms at very low concentrations. (See *Anumukti* Vol.4 No.5 April/May 1991). Radon, is most dangerous because, being a gas it is the only uranium decay product that can be breathed into the body. It also emits the most dangerous form of radioactivity-a radiation-which causes greater damage to lung tissue than other forms of radioactivity. Thirdly, radon decays rather rapidly and radon daughters decay faster still. Thus radon in the lungs just means a rapid burst of radioactive showers on the surrounding tissues. Accumulation of radon in underground tunnels is the reason why more uranium miners die of lung cancer than other miners.

**•What happens at the uranium mill?**

The rock is crushed and ground to a fine sand and mixed with large amounts of water and chemicals. The chemicals are either acids or bases, depending upon the pH of the ore. In India, acidic leaching is done using sulphuric acid. The solution is filtered, concentrated, purified and uranium is precipitated in the form of magnesium diuranate commonly known as Tellow Cake'. Two types of wastes (rejects in nukespeak) are generated, solid wastes or tailings and liquid wastes. Uranium tailing pose the greatest long-term threat, while leaks, spills and groundwater pollution by liquid wastes constitute the major short to medium term impact.

•Is radioactive pollution the only hazard of uranium mining?

No, tailings contain heavy metals such as lead, zinc, manganese, cadmium, and arsenic whose rates of release to the environment must also be controlled. These elements do not decrease in toxicity with time since there is no decay process. They simply last forever. Heavy metals poisoning is usually noticeable long before any effects of radioactivity. Huge quantities of process chemicals are used in the milling process and then dumped into the environment.

•Are there different ways of mining uranium and which one is better?

Uranium is mined in three ways and each method has its own unique set of environmental problems:

- Open-Cut Mining
  This is resorted in places where there is high grade ore fairly close to the surface as in Canada, Australia, U.S., South Africa. The whole area is bulldozed, and roads, plant and dams to hold the tailings are built. Environmental problems result from the great amount of surface contamination caused. (See the stories on Canadian and Australian mines)
- Underground Mining
  When ore is situated deep underground, then usually shafts are drilled and the mining is done underground as at Jaduguda. There have been a large number of reports from U.S. and Europe of mines being plagued by ventilation problems in the past, leading to excessive exposure of workers to radon gas. (See the stories on Jaduguda and on Red Rock in U.S.)
- 'In-situ Leaching'
  An acidic solution is forced through the ore-body itself to dissolve the uranium. This has been done in a number of places in U.S.A. and in what was formerly East Germany. The environmental problems here are obvious, with the ever present possibility that the solution of sulphuric acid, oxidizing agent, uranium and other toxic heavy metals would end up in somebody's drinking water. (See the report on the restoration problems in East German mines.)

•Can anything be done to mitigate the effects of uranium mining and reduce the contamination?

First and foremost, stop producing any more waste. Other steps include having physical barriers so that people, animals and birds do not come in contact with contaminated areas. Provide alternatives so that people and their animals are not forced to drink contaminated water or grow food on contaminated land.

*Sources: Miles Goldstick's book "Voices from Wollaston Lake" (See Review in this issue, page 10) and John Hallam's article on uranium mining in Australia.*

# Bury My Lungs at Red Rock

Red Rock was one of the first spots where the U.S.Atomic Energy commission and the post war uranium companies began prospecting for the radioactive fuel. Like m?ny of the other problems stemming from industrial and mineral development on the indigenous reservation, the misfortune of the people of Red Rock had its origins in the community's poverty and the lack of education. The Government and the energy companies were willing to take advantage of that underdevelopment.

In New Mexico, the nuclear story began with the 1945 Trinity Test, which confirmed that an atomic bomb could be successfully exploded. Three years later, the newly formed AEC began authorizing purchases of uranium to stockpile for its nuclear weapons arsenal. It started providing incentives to mining companies to find high-grade uranium deposits. It was during this period that Kerr McGee opened several shallow mines near Red Rock and set up a mill to process the uranium ore in nearby Shiprock, New Mexico.

When the mines uranium supply was exhausted in 1968, (the same year that Jaduguda mines started operation - Editor), they were abandoned, leaving contaminated build-up and more than seventy acres of uranium wastes. Also left behind were several hundred Navajo miners who had been exposed to deadly doses of radioactive gases and particulates.

Then, as now, the reservation offered a profitable opportunity to companies like Kerr McGee. On the reservation there were no taxes, little regulation and cheap labour. 'The company came around and said there were mining jobs opening up, but they didn't tell us **a** thing about the dangers of uranium mining," former miner Terry Light recalls.

John H Lee, who lives with his wife in a one-room unplastered home near the Red Rock area, worked as a miner for more than twenty years. He complains of spitting blood and stabs of pain through his lungs — the signs of a developing lung cancer. "I now feel sick all during the day so I just sit back in the chair and rest," Lee says, noting that he had seen most of his co-workers die. He has no doubt that his illness comes from his mining work.

"It made us sick to go into those mines,"Lee remembers. 'The white men sat outside the mines and pushed us Navajos into those dusty mines right after dynamiting."

'They chased us in there like we were slaves." recalls another miner. "I remember that it used to be so dusty that we were always spitting up black stuff and how when we went home we all had headaches from breathing all that contamination.

The major killer in uranium mines is the radioactive inert gas, radon that escapes from the uranium ore. The dangers of radon had been known for at least fifty years before the mines were opened, but the AEC refused to admit that there was any danger at all present in uranium mining for over twenty years of nuclear energy development.

'Those mines had more than hundred times the radioactivity allowed today." says La Verne Husen, director of Public Health Service in Shiprock. "They weren't really mines, just holes and tunnels dug outside into the cliffs. Inside the mines were like radiation chambers, giving off unregulated and unmeasured amounts of radon. The problem was that back in the 1950s nobody was riding herd on the companies. It was a get-rich-quick scheme that took advantage of Navajo miners who didn't know what radioactivity was or anything about its hazards.

Husen says that the two main problems caused by uranium mining were lung cancer and pulmonary Fibrosis, where silica dust particles become embedded in lung tissue, eventually making it difficult to breathe.

> *"In the last twenty years, lung cancer rates amongst Navahos have increased by eighty-five times.*

"The lung cancer comes from breathing radon gas," Husen adds. "It stays in the lungs and continues emitting radiation — sort of like walking

# The Death of Rio Puerco

> Navahos need safe drinking water. Instead, what they have got for last twelve years, are "studies"

Church Rock, New Mexico, would seem an improbable spot for a nuclear disaster. A dusty cluster of industrial machinery set in the arid mesas of the great Southwest U.S., its most distinguishing feature might be considered a large pond of murky liquid, unusual in such dry terrain. Church Rock also hosts a series of underground uranium mine shafts, a mill and a scattered community of Navajo families. A deep gully leads from the mine site into the Rio Puerco, which once flowed only when fed by spring rains. Now, it is wet year round, bolstered by water pumped from mine shafts to keep them from flooding. The 350 families who water livestock in the Rio Puerco rely on their small herds to eke out a meager existence. During the hot days of desert summer local children would play in the stream as their parents tended the goats,sheep and cattle.

In the early morning hours of July 16, 1979—just fourteen weeks after the accident at Three Mile Island-all of that changed. The then brand-new Church Rock tailings dam burst, releasing a million gallons of acidic tailings and 1200 tons of solid tailings into the Rio Puerco river. The spill extended 40 miles downstream through the Navajo territory into the neighbouring state of Arizona. No one was killed in the actual flood. But along the way it left residues of radioactive uranium, thorium, radium, and polonium as well as traces of metals such as cadmium, aluminum, magnesium, manganese, molybdenum, nickel, selenium, sodium, vanadium, zinc, iron, lead and high concentrations of sulphates. The water of the Rio Puerco and of the wells near it was rendered unfit for consumption. It remains so still. Livestock from the area cannot be marketed.

Except for the bomb tests, Church Rock was probably the biggest single release of radioactive poisons on American soil. Ironically it occurred thirty four years to the day after the first atomic test explosion at Trinity, New Mexico, not far away.

However, the spill was not an isolated incident of environmental abuse of Rio Puerco. For 18 years from 1968 to 1986 United Nuclear Corporation and Kerr-McGee mines continued to discharge uranium mine water into the river at the rate of 5,000 gallons per minute.

River contamination is still being "studied". According to a report issued by Robert Webb, a hydrologist for the U.S.Geological Survey, surface water of the Rio Puerco has sometimes between 10 to 100 times the maximum allowed level of radioactivity.

***Sources: Killing Our Own and WISE News Communique.***

around with an atom bomb in your lungs."

Lung cancer was formerly a rare disease amongst Navajos. In a seven year study completed in 1972, no cases of lung cancer were found in a review of 50,000 chest x-rays of Navajos. But the rates of lung cancers amongst Navajos have soared because of exposure to radiation. Dr Gerald Buker reported in a monograph entitled "Uranium Mining and Lung Cancer Amongst Navajo Indians.' that the risk of lung cancer had increased by a factor of at least eighty five among Navajo uranium miners.

"It is pretty hard here.' comments Ray Joe, a former uranium miner in the Red Rock area. It's like we have been having a war or something like that here — with so many of our men dead and dying or sick."

There are ten million tons of radioactive mess left on the Navajo reservation alone by Kerr McGee and other companies. The Department of Energy has estimated that it would cost $20 million (1978) to clean up these tailing piles, which due to their proximity to community settlements, pose a serious risk to the health of the Navajos. For the last ten years since 1968, wind and water erosion have spread radioactivity far outside the original perimeter of the uranium mills.

A two-year preliminary study amongst the Navajo found an unusually high number of birth defects, including hydrocephaly, microcephaly, downs syndrome, cleft lip, cleft palate and epilepsy among more than 500 babies born between 1967 and 1976. Earlier surveys had found a serious increase in bone, ovarian and testicular cancers among children living in the area of former uranium activity.

Like countless other tragedies in the history of Native Americans, this one remains lost in the dust of the vast, dry stretches of the reservations.

### Postscript 1990

In 1979 U.S.Congress passed the Uranium Mill Tailings Radiation Control Act (UMTRCA). The purpose of the Act was to set up U.S. standards for the clean-up of uranium mill tailings, implementing:

- an impervious layer under the pile to prevent seepage to groundwater
- a protective cover of several layers to prevent erosion, seepage of rainwater into the pile and emanation of radon to the atmosphere
- provision of long-term environmental monitoring and maintenance funds

However, during the eleven years since the passage of the Act only 26 million tons out of the 175 million tons originating from the uranium milled for nuclear weapons have been reclaimed. Only three out of the more than twenty piles were moved to safer locations during reclamation. Thus, even most of the 'reclaimed' piles still present a long-term hazard to environment and health since they could not be lined with an impervious layer to prevent seepage to groundwater. For this reclamation to be carried out the U.S.Government has already spent over $2 billion.

The major portion of the tailings originate from uranium mined for power generation purposes and has to be reclaimed by the uranium industry. This industry has repeatedly tried to weaken standards and to pass the cost of the clean-up on to others, so far unsuccessfully. But it has managed to delay the clean-up of these enormous piles.

*Sources: Tom Barry's article "Bury my lungs at Red Rock" in "First There Was The Bomb ...and WISE News Communique 326/327, 9th Feb. 1990*

## Joyless in Japan

High incidence of deaths from lung cancer have been observed among miners and local residents living near former uranium mines in Tottori Prefecture, Japan. The mines were operated by the Power Reactor and Nuclear Fuel Development Corporation (DONEN) in the late 50s and early 60s. During 1957-61, about 150 miners worked in the mine. Kyodo News Service sources say that more than ten miners and residents in the vicinity have died of cancer. Of these seven had lung cancer.

DONEN claimed that there was no relationship between the uranium mines and lung cancer. Many residents, however, spoke not only about the high rate of cancer in the area, but charged that the corporation did not warn about the dangers of radiation before the miners began working. Nor did the corporation require the miners to wear protective masks. DONEN countered that it did provide the masks, but a promotional pamphlet issued by the company contains photographs of T-shirt clad miners working in the mine without wearing masks. *(Most Uranium Corporation of India Ltd promotional brochures contain similar pictures - Editor.)*

*Japan Times* reporting on the incident, noted that high occurrences of lung cancer of uranium miners had also been reported from U.S. According to a U.S. public health report, of the nearly 6,000 miners who worked during the 1940s to 1960s, 10 to 20 per cent had died or will die of lung cancer. Many groups would put these percentages even higher. According to Big Mountain Legal Office in the U.S., of the 150 miners working at Kerr-McGee mines, 38 were dead of lung cancer and another 95 had cancer and lung diseases by 1980. Other health problems include a high rate of extremely rare birth defects such as Kneist Syndrome.

# Abuse of Aboriginal Rights

Three companies now control over half the entire world's uranium production, and more than two-thirds all uranium reserves. Two of these are government-controlled (France's COGEMA and the joint Federal Canadian /Saskatchewan provincial government's CAMECO). The third is the mainly British owned giant RTZ (formerly Rio Tinto Zinc), which is the world's most powerful mining company.

RTZ is the world's leading copper producer, its third most important gold producer, a crucial supplier of the strategic metal, titanium (used in aircraft industry), and on the top of the heap of western uranium producers.

Conzinc Rio Tinto (CRT) is the Australian subsidiary of RTZ. Its exploration lease in the Rudall River National Park in Western Australia has been described as potentially a three-act nightmare: a uranium mine, inside a national park, on Aboriginal land.

The 1.5 million hectare Rudall River National Park is the largest in Western Australia. The Aboriginal Martujarra tribe who are the traditional owners of the land, call it Karalamilyi. It provides one of the best examples of an undisturbed desert ecosystem in Australia and perhaps the world.

The nearest Aboriginal communities at Punmu and Pangurr are not legally recognised as landowners but have attempted since 1981 to establish viable settlements in the region. The story of last two hundred years has been one in which many Aboriginal people have lost access to their land and traditions, and have had their cultural and religious beliefs trampled upon.

This isn't the first time that CRA has mined uranium on Aboriginal land. CRA operated the Rum Jungle mine in the Northern Territory between 1953 and 1971, initially to supply Britain with uranium for its weapons testing programme. In that time a tailings dam collapsed polluting the Finniss River with radioactive waste and heavy metals. It has been biologically dead for years now.

In 1962, CRA's subsidiary, Comalco, bulldozed Aboriginal houses and a church to end opposition to bauxite mining on Cape York. In 1980, CRA flew three of the 35 traditional owners of the Warmun community to Perth and inveigled them to sign their land over to diamond mining. Leaked documents from that time foretell the kind of treatment Aborigines around Karalamilyi may receive... 'If CRA... can resist moves to meet Aboriginal compensation claims ...its savings will be substantially greater than the proposed expenditure on the company's public relations programme next year."

## " But I have promises to keep ...

The Promise

The environmental impact statement for the Roxby Downs uranium-gold-copper mine in South Australia predicted in 1982 that once the mine reached full production there'd be 10,000 jobs, $18-28 million in royalties paid to the state, and a boost in state exports by 32 to 43 percent. In 1989 the mine reached its full production capacity.

The Reality

800 jobs, $3 million in royalties paid to the state and exports of 4 percent. The $3 million falls well short of the interest the government has to pay on the $ 50 million it borrowed to build schools, roads and other community facilities for the mining associated town of Olympic Dam.

Rudall River is known for its strong dust storms around the beginning of the cyclone season. The Western Desert Land Council says local Aborigines are aware of radiation sickness and are worried that increased mineral exploration will destroy plants and animals in the park.

Uranium was discovered in the western part of the park by CRA in late 1985. Australia has a "three mines" policy which does not allow a new mine to start operations. Ostensibly only involved in exploration activities, CRA has in reality established a small-scale mining operation in the mountainous catchment basin of the Rudall River. A conservationist who flew over the site in mid-1986, confirmed the existence of a permanent camp with 40-60 personnel and 4 drilling rigs operating inside the park. Convinced that other uranium deposits are to found in the region, CRA has taken out exploration licenses on virtually the entire southern half of the park.

Strong pressure from Aboriginal people and the anti-uranium mining activists resulted in a statement in July last year from the Prime Minister saying that the Rudall River project would not go ahead. However, the clout of the mining giants became soon apparent when in April this year the same government brought forth new legislation which would allow the mining to go through. Although there is wide public support for a complete ban on mining in national parks the new legislation bans mining in only 57 out of 60 sites. It allows for continued access to areas considered to be of particular economic importance and would 'compensate' the park for the land lost to mining by addition of equivalent areas from elsewhere. Needless to add that while bringing forth this piece of legislation the Western Australia's Labour Government did not consult the people most affected by this decision nor did it consider the rights, welfare and the interests of the Martujarra people.

*Sources:*
*The Third Opinion &WISE News Communique: 351,336,325,307,282*

# Undoing is Not Easy

## Uranium Mining in German Democratic Republic

Uranium mining began in East Germany in 1946. The uranium was used for Soviet weapons production. The mining operation was carried out under the auspices of a joint Soviet-East German company SDAG 'Wismut'. By the time mining operation ceased in 1990 with German unification, GDR was the third largest uranium producer in the world after Canada and U.S.

The main reason for the closure of the mines was the fact that with the collapse of uranium prices during the 1980s, mining had long become terribly uneconomical, since the ore left was generally of poor quality (0.1%-0.09%) For comparison's sake, Canadian ore is ten to six hundred times richer in uranium. (The ore now being mined at Jaduguda and from which Uranium Corporation of India Ltd claims "profits" year after year, is just 0.03%—0.04%. Wonders never cease! - Editor)

The main mining area is in the south of the country in the Gera-Ronneburg region. This region is known as the "uranium province", and is now in deep economic recession with the closure of the mines. Wismut used to employ over 40,000 people till late last year.

The whole area has become an ecological disaster zone. Ore with too little uranium for extraction, along with wastes from the mines and mills is stored in enormous piles of tailings, covering an area of several square kilometers. Rain water washes the tailings away, endangering the ground water. Radon gas from inside the mines is simply pumped up to the ground and the pipes bringing the radon can be found in the middle of farm land still in use.

Data available on radiation levels in the whole area is still very poor. In some homes in the city of Schneeburg, radon levels above 30,000 Bequerrels/cubic meter have been recorded. ("Acceptable" levels are just 250 Bq/cubic meter. In the U.S., the acceptable limit for radon in homes is just 150 Bq/cubic meter.) The levels found in homes in Schneeburg are considered unacceptable even for uranium miners. They have probably been caused by former silver mining activities in the Erzebirge mountains.

> *Radon levels found in homes in Schneeburg are considered unacceptable even for uranium miners.*

A study conduct ed by an East Berlin doctors' collective and sponsored by the Lutheran church, found that rates for leukaemia and other cancers are significantly above average in this region. The study also found above average incidence of hair loss among both miners and other inhabitants, cases of impotence and testes cancer among miners and miscarriages and birth defects in miners' families.

The Schmirechau mine is the largest in the Gera-Ronneburg area. Four thousand seven hundred workers used to work there. Originally it had an open-pit mine with a depth of 240 meters; this has been partially refilled and mining was then continued up to 500 meters underground.

The uranium was milled at Seelingstadt uranium mill. Its annual capacity was approximately 3 million tonnes of ore.Its tailings pile is one of the largest tailings pile in the world and contains a total of 86 million metric tonnes of solid mill tailing and 51 million cubic meters of liquids in two ponds covering an area of 2.5 square kilometers.

The mill formerly used an acid leach process, but since 1990 it has used an alkaline leach process to achieve some neutralization in the tailings pond. The tailings contain an average of 11 Bq/gram of Radium-226 and a total of two million tons of pyrite. Radium-226 decays to produce radon. It also presents a health hazard on its own by seepage into ground water and rivers. Pyrite when mixed with air and water creates sulphuric acid and is thus lethal to plants downstream. It also helps in the migration of heavy toxic metals. The pyrite problem can persist for hundreds of years.

Now, a major effort is being made to reclaim and stabilize all the piles to reduce the health hazards. Under this plan for Schmirchau, 43.2 million cubic meters of material from different waste rock and low grade ore piles will be dumped into the former open pit mine there. After the end of all reclamation work, ground water will no longer be pumped out. Water will fill the whole underground tunnel system as well as the open pit being backfilled. Thus all materials now being dumped into the pit are expected to be in contact with groundwater for an indefinite period of time.

Western ecologists have criticised the plan. For one thing it is being executed without observing the legal procedure necessary under the new unified German law. The most serious cause for worry is however the persistent rumours that hazardous materials might have been dumped into the pit in earlier years under the previous government. However now it is probably impossible to remove parts of the backfill to confirm these suspicions.

The costs estimated by Wismut for the clean-up are DM 5 billion. However, this has been disputed by a study conducted by Oko Institute in FRG and the Southwest Research and Information Center in New Mexico who believe that the costs shall rise to DM 15 billion. Needless to say that neither the GDR government nor the Soviet Union had made any provisions for dealing with these costs.

*Sources: WISE News Communique Nos. 346,341,340,334,324/323,299*

## Voices From Wollaston Lake

*Resistance Against Uranium Mining and Genocide in Northern Saskatchewan*

Miles Goldstick

Earth Embassy and WISE 1987

Saskatchewan province in the west of Canada is the "Saudi Arabia of the uranium mining industry". The extra-ordinarily rich deposits—usually 100 to 1000 times richer in uranium than those being exploited in India—found there have made Canada the largest producer of uranium in the world. The same callous disregard for the environment and for the rights of the local population (usually indigenous people) that characterize uranium mining in the rest of the world including India, hold in equal if not greater measure in Saskatchewan too. Yet I have not separately included a 'story' about uranium mining there in this issue of *Anumukti*. The reason I have not is because this book "Voices From Wollaston Lake" says it all in an eloquent and moving manner. The book is available with the author and he would gladly send it to activists for just the shipping costs.

### WISE Uranium Special

WISE plans to publish a special edition on uranium shortly. The purpose is to provide support for local resistance to uranium mining. Protest and support groups are urged to send their contributions (particularly information on their needs and local campaign updates) to

Miles Goldstick
Box 1633, S-742
91 Osthammar, Sweden

The book can be divided into three parts. One part tries to present the contrast between two diametrically opposed world-views - that of the local indigenous people who are trying to live in harmony with their surroundings verses the dominance and the destruction of the land caused by the uranium mines. Another part of the book presents information on uranium mining, the 'uses'(abuses) of uranium, effects of mining on the environment and on people's health, while the last part of the book is the story of the struggle waged by the Chipewyan and people against the destruction of their land from 1972 to 1985 and especially the story of the unprecedented blockade of mining operations in June 1985. This action was the first coordinated nonviolent action against uranium industry in Canada.

Today it often seems as if Gandhi is no longer relevant to 'modern' India, what with "freeing the shackles on Indian industry" and the dire necessity of IMF loans for development. Echoing from the other side of the world, one of the voices which beckon from Wollaston Lake is the voice of Gandhi. It makes the book doubly relevant in India.

---

## German Pollution Fears

The Koenigstein mine near Dresden started operation as a conventional underground uranium mine in the 1960s. Underground leach tests were first performed in 1969. In 1984, conventional mining was completely replaced by underground leach technology.

In-situ leach mining is a process where a liquid leaching agent is pressed through a deposit and the liquid caught on the other side. Uranium and other minerals are then removed from the liquid in a recovery plant. The purified liquid may then be reinjected into the deposit.

The process is only successful under rather special geological conditions. The uranium must be located in a layer of permeable sandstone confined between impermeable layers. At Koenigstein, uranium was mined from an aquifer at a depth of 150-280 meters below the surface. Unfortunately, mining activity has connected this aquifer with the one above it which is used to supply drinking water to a densely populated area. Separating the aquifers is one very difficult part of the restoration programme.

800,000 cubic meters of leach liquid circulated between the ore zone and the recovery plant. Over 1,000,000 cubic meters of the liquid are still present in the ore. As the ore zone aquifer is not impervious, there was inflow of water into the leach liquid circuit. Therefore waste water had to be treated before being released into the Elbe river. This treatment produced enormous amounts of sludge that was dried and stored on waste piles. Besides this, water flowing into the underground tunnel system had to be pumped out of the mine and treated before being released into the Elbe. The total amount of treated water released in 1989 was 5.3 million cubic meters. Also released with this water was 1.7 billion Bequerrels of radium-226 which was dissolved in the water.

The mine reclamation plan hopes to neutralize the leaching liquid in the ore zone by injection of limewash for at least the next ten years and by then allowing the mine to flood. However, there has not been extensive research on this subject to prove whether this would work in the long term. Attempts will also be made to prevent unequal settling of the rock layers by blasting the remaining pillars in the mine but the effectiveness of this step is also questionable.

# The Peril in Peringome

Nuclear Power Corporation has finally selected the site for the proposed nuclear power station in Kerala. Successive State Governments—both the present United Democratic Front (UDF) as well as the previous Marxist led Left Democratic Front (LDF)—have been giving full cooperation in this proposal regardless of the wishes of the people.

Peringome is situated just 12 km from the thickly populated municipal town of Payyanur. The place will be shortly taken over by Nuclear Power Corporation according to a statement made recently by Department of Atomic Energy chief, Dr.P.K.Iyengar at Thiruvandapuram.

In the early eighties, even before the great tragedy at Chernobyl, the Government of Kerala had to retreat from an infamous attempt to construct a nuclear power plant at Bhoothathanakettu in Ernakulam district. There had been stiff opposition to the move from the people, and just before the 1984 elections the ruling party had made a public statement to the effect that the move was being abandoned in view of the strong public opposition.

Awareness about the ecological, socio-political and other aspects of the nuclear issue has been gaining momentum in many parts of Kerala, thanks to the ceaseless efforts of environmental groups, antinuclear activists and intellectuals. People's protest has grown along with awareness.

Strangely enough, the nuclear establishment seems to be in no mood to give up its pursuit to extend their empire even to the most densely populated state of Kerala. It appears as though the nuclear monster needs to be settled at one place or another within Kerala. During last one year, members of the Nuclear Power Corporation's Site Selection Committee visited many places throughout the state. Despite the secrecy surrounding these visits, the nucleocrats were greeted with loud protests by the people of the respective places viz.Peringome (Kannur district), Bela (Kasargod district) and Kothamangalm (Ernakulam district). The nuclear lobby was provided every help and facility by the then Chief Minister, Electricity Minister and other concerned officials inspite of the fact that the government kept insisting that no power station would be built against the wishes of the people.

### OATH

*In the name of the thousands who died in Hiroshima, and*
*those who are still dying, we pledge:*
*We will be constantly vigilant against nuclear power.*
*Three Mile Island, Windscale, Kyshtim, Chernobyl —*
*In the name of the victims of these disasters*
*which turned acres of fertile land into a vast expanse of dead desert,*
*We won't allow the use of nuclear power*
*We are obliged not to pollute our air, water and the Earth,*
*while bequeathing them to our children, humanity,*
*We shall not be unfaithful to this obligation*
*We uphold our belief in the innate goodness of humanikind*
*We cannot allow any one to let loose the mysterious and*
*uncontrolled evils of nuclear power.*
*What they told us — that nuclear energy is for electricity*
*We now realize to be a big lie.*
*We are against bombs and wars,*
*And the silent wars of reactors*
*We won't throw our children in a sea of radiation.*
*Forgetting all our petty differences,*
*And joining hands we vow*
*To fight against this nuclear monster*
*And defeat it at all costs.*
*On this the Forty sixth anniversary of Hiroshima*
*This is our solemn oath*

Against this background, hundreds

of public meetings and discussions were initiated by several environmental groups throughout Kerala. As a result antinuclear forums and groups have sprung up in several towns and villages of the state. Chernobyl Day is being observed in various places and in 1990 a state-level convention was held in Thrissur. Conventions and rallies have been organised in a sequence at Kozhikode, Kottakal. Pavvanur, Triarpur, Peringome and Bela in which prominent antinuclear activists from outside the state also participated.

Meanwhile, the previous L.D.F. government sacked an eminent scientist, Prof. R.V.G.Menon from the directorship of Agency for Non-conventional Energy and Rural Technology. (See *Anumukti* Vol.4 No.l- Editor.) The action was obviously a measure of vengeance for his publishing an article about the hazards of nuclear technology. The fact that the government action against one of the most popular exponents of the people's science movement coincided with the intensification of the propaganda regarding the indispensibility on nuclear energy, clearly exposed the anti-people nature of the developmental policies followed by the government and the uncritical acceptance of this developmental model by the L.D.F.

Nucleocrats in India have been arrogantly marching forward with their killing technology totally disregarding the immense amount of new information that has been pouring in about the hazards involved in mining, processing, transportation, and use of uranium. They are still trying to sell the big lie that nuclear power plants are meant for generating electricity. The proposed plant at Peringome will incur an expenditure of Rs. 2,500 crores and will produce electricity for mere 25 years. Considering the fact that the construction of the plant would take several years and during operation it will shut down frequently due to 'leaks', during which time it would consume enormous amounts of electricity supplied from outside, the claim that the plant will solve the chronic problems of Voltage crisis' of Northern Kerala, ring hollow.

People of Kerala are now engaged in a bitter struggle to oust the nuclear monster. Hiroshima Day, 6th of August 1991 was observed as Peringome Protest Day. All the Sate Government and Central Government offices were brought to a standstill in and around Peringome. Around three thousand people, with hundreds of women with babies in their arms courted arrest while picketing government offices at various points. At the end of the token strike, people from all walks of life took the oath to fight the nuclear monster with all their strength. (See box on previos page.)

There were solidarity rallies and fasts organised throughout the state, in which prominent intellectuals, writers, scientists and religious heads actively participated.

We request environmental groups, antinuclear activists and all peace loving and democratically minded people throughout the country to express their solidarity with the people's struggle at Peringome.

*Dr Surendranath*
*Antinuclear Forum*
*Peringome, Payyanur, 670332*
*Kerala*

# Workshop on Nuclear Power at Ruia College, Bombay

The workshop was part of a series of workshops being conducted every fortnight in different locations in Bombay and was held on Saturday, the 3rd of August, 1991, from 10.15 in the morning till 5.00 in the evening. About 100 students and staff members attended the workshop. The workshop was conducted by Shri R Ashok Kumar of the Bombay Sarvodaya Mandal and Ms Aradhana of the Sampoorna Kranti Vidyalaya, Vedchhi and was held under the auspices of Science Association of Ruia College.

The main points raised during the workshop were:

- The health consequences of continued widespread use of nuclear power would be the death of all forms of life Leaving uranium in the ground is infinitely better than bringing it up and exposing life to its lethal affects
- The nuclear enterprise consumes more energy than it produces
- Radioactive waste produced cannot be recycled and waste storage for thousands of years is impractical

Nuclear power plants are very complicated and the number of possible malfunctions which can lead to disaster are innumerable. Thus safety of these plants can never be assured.

*R. Ashok Kumar*
*Bombay Sarvodaya Mandal*
*Nana Chowk, Bombay-7*

# Nuclear Energy Awareness Programme in Gujarat

The spate of problems besetting operation of nuclear power plants in the country are too well known for enumeration. Despite these horrendous problems nucleocrats are blithely going in for further expansion. Narora-2 and Kakrapar-1 are ready and can become critical any day now. Kakrapar-2 is also nearing completion. Work on Kaiga -1 and 2 and Rawatbhata -3 and 4 is going on apace, while despite great public opposition, Department of Atomic Energy seems determined to site reactors in Kerala.

In view of this, Sampoorna Kranti Vidyalaya, Vedchhi has organised an intensive nuclear energy awareness programme starting from Hiroshima Day and lasting up to Gandhi Jayanti on the 2nd of October. It is envisaged that most of the Gandhian post basic schools of South Gujarat and a few in North Gujarat would have had some exposure to the perils of nuclear energy by then.

The programme began in a remote Adivasi village school of Samba by singing of antinuclear songs and talks by Ms Aradhana and Shri Suren Raut. The same evening there was a slide-show in the Ashram-school at Vedchhi. Functions have already taken place at several village schools including Kalamkui, Vyara, Golan, Rupan, Patal and Samba.

An interesting sideshow was provided by the officials at Kakrapar. Every year since 1986, August 6th is the Gujarat Police Reunion Day at a site some three kilometers from Kakrapar Atomic Power Plant. They gather at this site in their hundreds with all the paraphrenalia including buses, trucks, horses, radio-equipped jeeps, etc., since in 1986 on Hiroshima Day there had been a strong protest against the plant. However as preparation, they make it a point to send a constable or two to Sampoorna Kranti Vidyalaya every day starting from the first week of July. However, by the beginning of August we have invariably been blessed by visits from higher officials including the plant supervisers at Kakrapar.

This had been the unfailing pattern. However, this year more than half of July passed off and there was no sign of the cops. We started feeling somewhat lonely. As the song goes, we had grown accustomed to their face! So we wrote a letter to the plant authorities that as part of the Atomic Energy Awareness Programme we would like to have a slide-show in the plant and could they please arrange for the transport. And lo and behold, our old friend, the sub-inspector from Vyara promptly turned up on the third day and asked us the very same questions that he had last year. Of course the plant authorities have not yet deigned to send us any reply to our letter, but this year the "show of force" at Kakrapar was so impressive that even some normally sedate Gujarati newspapers felt constrained to utter a mild reproof.

*Sanghamitra Desai Gadekar*
*Vedchhi, 394641*

# On Being One in a Million

## The 'Science' of Risk Assessment

If your best friend says you are one in a million, take it as a compliment. If a scientist hired by the incinerator industry says it, it might just mean that you are going to die prematurely. Hundreds of people, all "one-in-a-millions," die each year from the pollution from incinerators and toxic waste dumps. To quiet the bereaved and turn this tragic toll into a form of publicly sanctioned Russian roulette, the government and industry are turning to a sham science called risk assessment.

What risk assessment provides is a number—"six additional cancers among 100,000 most exposed individuals," for example, as a result of having 25 truckloads of dioxin-contaminated industrial waste burned each day in the incinerator next door. The number is often accompanied by a comparison - "you take a greater risk from radiation received during a long plane flight." This one-two punch is designed to disarm the opposition. After all, what kind of a wimp wouldn't accept that small risk in exchange of myriad benefits-jobs and "security"-that such an incinerator would bring to the community.

Well, me for one. And here's why. First of all the numbers that come out of a risk analysis depend on the accuracy of the numbers that go in. To put it bluntly, the people that plug in these numbers don't know what they are talking about. Incinerator emissions contain close to 100 different chemicals, only a few of which have been analyzed for their effect on humans. These analyses, always controversial, are continually being revised. As for the rest of the chemicals, science draws a blank. And what impact these different poisons might have when combined is anybody's guess. Such Combined effects have never been studied.

The other question that needs to be asked is this: what risk is being assessed? Usually it is cancer-a grim and unpleasant threat, to be sure-but cancer is not the only hazard out there. Among the many other health effects caused by the murky soup of environmental pollution are birth defects, immune system damage, developmental disabilities, organ damage and a host of other sub-lethal impacts that are far less well-documented. And the standard member of the public these assessments are designed for is a 30-year-old-white male. Granted, there are lots of them, but they are the least vulnerable to toxic assaults on their health. Left out are infants, notoriously more sensitive to pollution, the aged and the already sick.

With all the uncertainties one ultimately finds that a risk analysis can be made to produce almost any conclusion. As one wag put it, risk assessments are like political prisoners-torture them enough and they will say anything. The essential variable it turns out, is who pays for them. The U.S. Environmental Protection Agency (EPA) discovered this fact in the mid 80s when it decided to let private corporations do their own risk assessments of toxic waste dumps on their premises. Suddenly, sites you wouldn't fly over were deemed suitable for picnics, with all the evidence packaged in neat and convincing scientific papers. Shortly thereafter, the EPA quickly took back its assessment responsibility-private analyses, one regulator declared delicately, proved "hugely optimistic."

Politics and uncertainties aside, however, the use of risk analyses as a means of crafting public policy raises larger social questions. Is it right, for example, to permit one segment of society to impose "risk" on another? Why should a scientist hired by a corporation have the right to declare

10 cancer deaths in a community "acceptable," while baiting the victims with the promise of jobs? And is it not my right to voluntarily accept the risk of the small dose of radiation received during a long plane flight, but not accept the risk imposed on me, even if some scientists tell me it is smaller, to have a nuclear waste dump next door?

Science serves us when it is devoted to improving our lives, not when it is used to hide bad environmental policy. After all, which would you rather have-a $100,000 risk assessment telling you that the $30 million municipal incinerator proposed for next door will kill only one of your neighbours each year, or a $1 million recycling programme that will make that incinerator unnecessary?

*Andre Carothers*
*Editor Greenpeace Magazine*
*Source:E The Environmental Magazine May/June 1991*

# Czechoslovakian Contamination

The MAPE uranium mill at Mydlovary near Ceske Budejovice has been the cause of severe radioactive pollution dating from the early 1960s. Up to 80 percent of the cattle grazing in the neighbourhood of the facility died in 1962/63 from leukaemia or deformities because of an accident which took place in the early 1960s but has been kept secret till now. The only precautionary measure the authorities took at the time was to close down a drinking water well without informing the people as to the real reason behind the move. Another spill occurred at the same site in 1964 and there have been several instances of malfunctions thereafter. News of the second accident was made public by Ministry of Agriculture officials in a Prague newspaper *Mlada Fronta*, just two days after Greenpeace released information regarding the first accident.

The catastrophic situation created by the first accident was only discovered after the increases in the cases of leukaemia and mutations were monitored with cows in the vicinity of the plant. The area around MAPE is used intensively for agriculture and livestock breeding, mainly cattle, geese, fish and hops. In 1962/63 officials from the regional slaughter house commissioned veterinarians from the Veterinarian Institute in Budejovice to find out the reason for the sudden increase in leukaemia and mutations. The results clearly indicated that only radioactive contamination from MAPE could be responsible. Documents relating to the investigations were immediately declared top secret.

Pollution continued during the succeeding decades, through the "normal operation of the mill." Between 1965 and 1j985 radioactive waste water of the mill was released directly into the Vlatava river. Since 1985, radioactive tailings and waste water have been released into former open-pit coal mines right next to the mill. Greenpeace, which is demanding an investigation of the situation and is conducting a campaign in surrounding cities and villages, has received official analyses from the Czech Institute for Hygiene between the years 1979-81: the eight control points located in a circle of eight kilometers around the plant showed significantly higher measurements of radioactivity. The official reaction: four control points where the largest readings were recorded were shut down.

Since the mid 1989 the MAPE uranium mill has also treated the uranium ore from the West German Menzenschwand uranium mine. This deal was made after the closure of the only West German uranium mill at Ellweiler, for excess radon releases. Questions raised by the Greens in the West German Parliament on radiation standards of the Czech uranium mill were answered by the statement that the West German Government supposes that the Czechoslovakian Government was observing international standards...

> *Eight control points showed significantly higher measurements of radioactivity. The official reaction: four control points where the largest readings were recorded were shut down.*

On 21 January 1990, some 500 uranium miners gathered at Pribram, which is one of the mining centers in Czechoslovakia. They were demanding disclosures of the dangers posed by radiation to their own health. They had no confidence in the administrative staff of the mines and the health department which have remained unchanged since before the revolution.

There are about 30,000 people employed by the Czechoslovakian uranium mining industry. About half of them work in underground mines and mills. It is known that although many workers came to the mines because of the high wages offered there, prisoners have been forced to work there. Working in the mines (for ten years) is also offered as an alternative to conscientious objectors to avoid compulsory military service.

After 3200 working shifts (somewhere between 15 to 17 years) underground, workers are employed on the surface-but this is also dangerous since high levels of radiation have also been recorded in some of the offices and in parts of the mills. Workers retire at the age of 55.

A former uranium miner who had worked for thirty years beginning in 1947, said, "We were a group of eighteen. Seventeen of us died of lung cancer. I am the only one who survived." Another miner was quoted as saying, "When they found a radiation induced disease in my blood, they did not tell me the results of the investigation They made false diagnoses to prevent recognition of an occupational disease."

# Greenpeace Indicts French Nuclear Industry

The French nuclear power programme, upheld throughout the world as an epitome of success by the nuclear industry, has come under scathing criticism in a new report from Greenpeace International. The 136-page report, written by economist and political scientist Dr Francois Nectoux, focuses not on safety issues-though they are peripherally addressed-but on what is supposed to be the French industry's pillar of strength: the economics of the programme.

According to Nectoux, Electricite de France (EDF), the nation's nuclear utility, suffers from the world's largest private debt, which Nectoux places at $38 billion (other reports have put the debt at over $40 billion). Nectoux sees little chance that EDF will recoup the debt, and indeed points out that France currently has substantial over-capacity (about eight large reactors worth), even while EDF considers ordering several new large reactors in an effort to preserve its scientific infrastructure. Since 1974, Nectoux argues, EDF has shown losses of 30.2 Billion French Francs and profits of only 2.7 Billion Francs.

Nectoux also points out that French electric rates, while cheaper than Germany and Italy, are more expensive than Denmark or the Netherlands, and are comparable to the U.K. once artificial trade barriers are discounted. Moreover, Nectoux argues that the rates would be even higher without the presence of a significant portion of very cheap hydropower.

Two other issues of great interest to U.S. (also to India - Editor) are also brought up in the report.

The first is that EDF has been unable to maintain its 1970s construction schedule of five years for completion of a large reactor, casting severe doubt on the ability of the much less centralized U.S.industry to build reactors in a similar time frame. The U.S.industry argues it can complete reactors in five years, which is essential to its ability to provide nuclear power in an economical manner.

The second lesson is France's experiences with its standardized reactor designs; essentially France has two designs, a 900 MW Pressurized Water Reactor and a 1300 MW Pressurized Water Reactor. But as critics have frequently pointed out, flaws in a standardized design affect not just one reactor, but all of them. In France's case serious steam generator problems have plagued both of its designs, leading to costly repairs and a greater risk of accidents.

For more information on the report contact:
Greenpeace,
1436 U Street NW,
Washington DC 20009, U.S.A.

*Source: The Nuclear Monitor July 15, 1991*

## LETTER BOX

I am undertaking some research work on the Indian nuclear fuel cycle and would like help with some specific information.

- In the July 1991 edition of *Anumukti*, there is an article "Chernobhata", relating health effects form the Rajasthan Atomic Power Plant on the surrounding villages. Do you have any further evidence of health effects relating to this or other plants in India?
- In many countries with nuclear energy, the nuclear industry is undertaking a large public relations exercise in order to try and convince the public that nuclear power is an important energy source. Has the industry in India started any public relations exercises like this?

*Antony Froggatt*
*Greenpeace*
*Canonbury Villas, London Nl 2PN*
*U.K.*

As you may be already aware, we have started direct struggle against Peringome Nuclear Power Plant. We understand that the site selection committee has recommended this **place as *one of the best possible sites in the world.***

On Hiroshima Day, thousands of people courted arrest while picketing various government offices in Peringome. We are also getting full support from renowned editors, writers, intellectuals and even political party leaders, both from the right and left of the political spectrum.

New, though not unexpected, developments include the recent stand taken by the Communist Party of India (Marxist) (CPM) State Secretariat which has for the first time come out openly against the struggle and has denounced it as "ill-motivated". Though CPM secretariat has lost much of its bureaucratic teeth in recent years, there is no doubt that many of the people in and around Peringome do owe allegiance to that party. There is no doubt that the tone of gross callousness and insensitivity reflected in the statement will not go unnoticed by the people and the stand taken on just this single issue alone may spell disaster for the party. A noteworthy point about the action on August 6th was the fact that it was inaugurated by a veteran CPI leader, K.V.Surendranath, Ex MLA and the struggle is being led by mainly members of SFI and DYFI (both CPM oriented organisations).

*K.M.Venugopalan*
*Annur, Payannur 670 332*
*Kerala*

The struggle against the proposed Peringome nuclear power plant will be an uphill task since there are no evacuations involved here.

Thousands of acres of government land is available. The fact that all the major political parties, whether of the left, right or center are in favour of the plant's construction, presents one of the biggest hurdle to the agitation. At the same time Dr P.K.Iyengar, the head of Department of Atomic Energy, seems determined to establish the plant as a 'gift' to his home state. The government and the Kerala State Electricity Board are all for the establishment of the plant and anyone who speaks against nuclear power is dubbed anti-national. It is against such heavy odds that we have to fight here, as elsewhere.

*K. Ramachandran*
*Payyanur, 670 332 Kerala*

In Alabama and U.S. Southwest in general, also in the Southwest, we too are working very hard on the nuclear issues. In the U.S. we are very concerned that "obsolete" missiles are discussed for dismantling but simultaneously new, far more accurate and destructive missiles are being produced and loaded onto nuclear submarines in Bangor, Washington and Kings Bay, Georgia. This is the Trident II or D-5. We are very active on this issue as well as on the transshipment of hazardous nuclear wastes. The only thing to do is to stop now all the production, shipment and deployment of nuclear weapons. It is unfortunate that this trip I am not so free to be able to move around much. Otherwise I would dearly love to come and visit your institute at Vedchhi again. It has really been the inspiration for the development of our tiny project in New Mexico.

*Dr Jane M Christian*
*Centre for Applied Linguistics*
*University of Hyderabad*
*Hyderabad* AR *500134*

SAHAJA, a women's group here, is conducting a two-day seminar on "Energy and Women". Our group, Women Against Nuclear Energy is presenting a paper entitled, "Nuclear Issue is Also a Women's Issue ". The seminar will be held in the last week of August. We shall welcome any comments, so that they can be circulated amongst the participants.

The study being carried out on the genetic effects of high background radiation in Kerala is almost finished and we hope to have it published within a couple of months. The preliminary work on the study of cancers in Kanyakumari has already begun.

I am planning to work on a project, "Environmental Issues and the Judiciary". It will be for a period of two years. If you have any materials related to this topic, for example, the legal struggles here and abroad, please send me a copy.

*K.Nandini*
*CISEC Kottamukku,*
*Kollam 691 013*
*Kerala*

Koodankulam is going ahead in Tamil Nadu. There is no organised resistance, no one really understands that we are importing our own Chernobyl. The local people have no clue what atomic power is. We need a concisely written article explaining it so we can produce from it a leaflet in Tamil with a brief English summary. I can find some local funds to print and distribute it. Also, can some whiz kid design a good, imaginative, hard-hitting anti-nuke sticker — we could print Tamil and English versions. I will raise part of the money do do a run of 5-10 thousand. We may not be able to do much, but we can't sit quietly by!

*Rom Whitaker*
*Madras Crocodile Bank*
*P.O.Bag 4, Mamallapuram 603104*
*Tamil Nadu*

Special Offer

| | |
|---|---|
| Nuclear Reactors in Tamilnadu | Rs.15 |
| Nuclear Complex at Kaiga | Rs.30 |
| Dangerous Earths, Tragic Sands | Rs.20 |
| Nuclear Words and Terms | Rs. 10 |
| Chernobyl: Five Years Later | Rs.10 |

10% discaount on any title, free postage!
Special rate for the entire set of books: Rs.80 only

Other India Bookstore Mapusa.Goa

Subscription Rates:

Rs. 25/- per year South Asia
U.S. $15/- per year or equivalent in other hard currencies (airmail overseas)
(Rs. 300/- per year if paid for in India)
Rs. 250/- for life (only within India)
Please add Rs. 6/- for cheques
Drafts should be drawn on State Bank of India Valod (0531)

Editor: Surendra Gadekar

Subscriptions, donations, manuscripts, inquiries regarding circulation, etc. should all be addressed to:

Editor Anumukti
Sampoorna Kranti Vidyalaya
Vedchhi, Dist: Surat, 394641 INDIA

Published by S.Gadekar for Sampoorna Kranti Vidyalaya and printed at The Parijat Printry, Ahemedabad

**PRINTED MATTER** **BOOK POST**

ANUMUKTI
A Journal Devoted to Non-Nuclear India
Volume 5 Number 2 October/November 1991

A Grim Tale From The Nuclear **Fairyland**

# A Heavy Whitewash

On 27th of July, there were barrels of heavy water which needed upgrading, standing in a corner of the upgrading plant building. The building was to be whitewashed and a contractor had been assigned the job. One of his labourers, Shri Madholal, who was to do the actual whitewashing found that there was no water in the taps. He made the wash in the barrel of heavy water and then proceeded to put a coat of whitewash on the walls of the room. After finishing his work, Shri Madholal washed his brush and then washed his hands and face with the same heavy water. The report said that in the process about 40 litres of heavy water worth Rs 250,000 was contaminated and thus wasted.

As soon as information regarding this event reached the authorities, there was consternation and panic amongst them. The new coat of whitewash was scraped off the walls and sent off to the laboratory for tritium analysis. Shri Madholal immediately disappeared from the scene and his whereabouts were unknown. The chief suprintendent of the power station, Shri T S V Ramanan, even while admitting the veracity of the incident insisted that the quantity of heavy water lost was very small. According to him Shri Madholal had only washed his brush in the heavy water but had not used it to paint the walls. No other officer at the plant, besides Mr Ramanan was willing to talk at all about the incident with news correspondents.

*Rajasthan Patrika 21.8. 91*
*Dainik Navjyoti 21.8. '91*
*(Translated from Hindi)*

**Editor's Note:**
Indian nuclear reactors use heavy water in large quantities for cooling and moderation. The coolant heavy water is circulated under pressure and quite often it leaks from the pipes on to the floor of the reactor building. Heavy water is extremely expensive. The Comtroller and Auditor General of India had estimated in 1988, that a kilogram costs Rs 13,400. In fact using the C.A.G.s figure the cost of 40 liters would be more then 5 lakhs, but that is besides the point. I mention it only as an illustration of the petty kind of chicanery, the

nuclear administrators do to minimize damages caused by information leaks. But it is indisputable that any heavy water which is lost is a great financial burden and great efforts are made to recover all leaks and spills. But, despite all effort some heavy water cannot be recovered. It is important to make this point because nucleocrats have now started claiming that "Every drop of heavey water is collected. (See Lies, Damned Lies and Nucleocratic Explanations on page 7 of this issue.)It has been reported that the Rajasthan unit-1 reactor's spillage is of the order of 95 tonnes a year and the recovery is about 78 tommes a year. The other 17 tonnes is lost to the atmosphere. That is, around 45 kg, worth more than Rs 6 lakhs in 1988 prices is lost every single day. Similarly unit-2 loses around 10 tonnes of heavy water every year.

Used heavy water is radioactive since neutron bombardment experienced by the molucules of heavy water result in the production of tritium which is radioactive. It can also be contaminated with ordinary water and this severely affects its neutron absorbtion properties. Thus the heavy water which is recovered from the reactor building needs to be upgraded-that is brought back to requisite purity-so that it can be reused in the reactor. This is done in an upgrading plant situated in the heavy water plant complex.

The incident well illustrates the lax safety procedures and the lackadaisical attitiude towards the safety of their own lower rank workers obtaining amongst officers in nuclear establishments in India. The people who do the actual work are often casual labourers employed on a temporary basis through labour contractors. They are given no training whatsoever and have no understanding of the hazards involved. Supervision is at times non-existent. The major effort of the authorities, on those rare occasions when a failure of the information security system does throw the glare of public scrutiny on them, goes in trying to play down the seriousness of the consequnces. And it is the Madholals of the world, who have to pay the costs of this wretched system. Not only does this poor man, loose his only means of a meagre livlihood, no serious effort is made to trace him and help him medically since there can be no doubt that he at least has ingested measurable quantities of radioactive tritium. The only loss that bothers the authorities is that of their precious imported heavy water.

➤

## From The Editor's Desk

Many years of my life have been spent "doing research" in Physics. Some would prefer the word wasted, but I don't subscribe to that view. Doing research meant many separate actions: sitting in air-conditioned comfort in a library and readingjournals and books; talking and discussing ideas with friends till early hours of the morning; sitting with a pen and paper (usually backs of used computer sheets) trying to come with a theory to explain the phenomena of interest and so on. Usually I ended up just doodling pictures, but by and by I learnt the tricks of the trade and became fairly adept. Not by a long shot in the first rank, but able to get along and be accepted as one of their own by most of the physics biradari.

The research that I did do reflected the priorities of the international physics community. Phase transitions and critical phenomena, dynamical theory of glasses, charge density waves, 'and so on. All rather interesting and great fun to do, but even I would not claim that my doing this work had any relevance to the lives of the common mass of people whose taxes were paying for it. What kind of research should the state sponsor is a complicated question and something of a Pandora's Box and anyway is not of immediate interest to readers of *Anumukti.* But over the years, I often wondered if it would be possible to do research which would be of immediate relevance to people's lives and how to do it and who would pay for it. The health survey of villages around Rawatbhata and Rampura that we organised in September was a small attempt at doing people oriented research. We could not have done this work at all without the great help rendered by many different groups of people. In this issue we have a report regarding how the survey was done and also about the reactions it engendered amongst nucleocrats. The analysis of the data that we gathered is being done and we ought to have complete results by the middle of February at the latest.

### An Apology

This issue which should have been out by the beginning of October has become so late that it is a shame and a scandal. People have started wondering if they have received 'mukti' from *Anumukti.* No apology can suffice. My only excuse is that we have been overwhelmed by work. However the important point to consider is how to get back on the regular schedule. What we intend to do is the following: get the next issue out by January 25th, 1992 and then a double issue focussing on the Rawatbhata health survey analysis by the 15th of March. We will not bring out a separate April/May issue and then resume regular schedule of publication with the June issue.

## Mohan Parikh 1922-1991

*'Monnai' was a versatile genious who accomplished more in one lifetime than what most can manage in many. He was an inventor, a designer, a popularizer of science, a teacher. He took science to the villages not through writing books and articles but by designing and producing tools and implements which would be of direct use to people. His passing away is an immense loss to the worldwide movement for an ecologically sensible and humane alternative society. The loss to Anumukti and to me personall;y is even greater.*

# A Report on the Rawatbhata Health Survey

We first went to Rawatbhata in April, 1990 at the invitation of the Parmanu Pradooshan Virodhi Sangharsh Samiti, which was a body formed by Sarpanches often villages around Rawatbhata. Despite the name, this was not an antinuclear group. The invitation to us was the proverbial clutching at straws when drowning. They had originally invited us a year previously,.but then had later cancelled the invitation. This cancellation had been done because the RAPS (Rajashan Atomic Power Station) authorities had promised to look into their complaints on the condition that they would cancel their invitation to antinuclear groups to come to Rawatbhata. Their demands were the usual demands of people with respect to development projects: When would we taste the fruits of development. They wanted jobs, schools, roads, access to medical facilities... One of the points they made was the fact that even after seventeen years, the village on whose lands the reactors had been built, (Tamlav) had still to receive electricity connections. (See Sunil's article *Rawatbhata: Development Brings Dissatisfaction* in *Anumukti* Vol.3 No.5, April, 1990)

Our report about the visit *(Chernobhata* ?) was published in *Anumukti* Vol.3 No.6, June, 1990. It received a good amount of national and some international publicity. During the last one and a half years, other newspapers sent reporters and photographers to the area and they have published a number of reports. A British journalist, Christopher Mitchell made a clandestine film, "The Price of Power", which was shown on channel-4 in Britain on April 2, 1991. Excerpts from this film along with an interview with the Secretary, Atomic Energy Regulatory Board (AERB), Dr. K.S.Parthasarathy, were shown in the September edition of "Eyewitness"—a videomagazine brought out by *Hindustan Times TV*. The release of this video caused quite a commotion with questions being asked in the parliament and the subject remaining in the news for quite a few days running.

## Nuclear Santa Claus

The glare of publicity has caused some movement in the usually slow moving government machinary. For example, just since May 1990:

- Electricity connections have been made to some houses in one hamlet of Tamlav.
- The authorities have admitted that the water in the wells and in the ponds may be contaminated and have warned the people not to drink it. A pipeline extending well over a few kilometers has been laid to supply the villagers with potable water and a tank has been built in Tamlav to store the pipeline water.
- Apointment of a compounder and an auxiliary nursing midwife has been made to the village dispensary of Jharjhani and they are residing there at present.
- While our survey was in progress the state government announced that it was converting this village dispensary at Jharjhani into a primary health centre and a resident doctor would soon be posted there.
- Some local youths have got permanent jobs in DAE (Department of Atomic Energy) run establishments.

Besides the DAE authorities have within the last year promised:

- Rs.50 lakhs towards the construction of a local referral hospital at Rawatbhata.
- Rs 50 lakhs to the road department to construct all-weather roads linking some of the villages with Rawatbhata.
- Rs 22 lakhs to the forest department for aforestation of the denuded hill slopes around Rawatbhata.

I am not claiming that this downpour is only due to the publicity generated by our trip, but the fact remains that DAE and the State Government had not done any of this during the last seventeen years after the plant was established but did do it during the last year and a half. At the same time, DAE mandarins and some nucleomaniacs in the press started a systematic campaign of trying to discredit the observation that there is something unusually wrong with the health of the people around Rawatbhata. (See Lies, Damned Lies and Nucleocratic Explanations on page 7.) Therefore, it became more and more necessary to find out some basis for objective assessment rather than relying solely on subjective evaluations of different 'biased' individuals.

## The Basic Difficulties

For the past year we had been trying to persuade various indepedent organisations who had expertise in the matter to conduct a door-to-door survey of the area. We felt diffident about doing the survey ourselves since we had very little expertise and virtually no resources to undertake this task. Unfortunately no organisation came forward to do this work on their own. Some organisations, who did show an interest, wanted to submit project proposals and get approval and grants from the government before proceeding. However, government approval essentially means approval from DAE and they have been notorious for delaying grant of approval for such surveys. For example, they delayed for five years before giving grants to South Gujarat University for making a baseline health survey of the area around Kakrapar nuclear power plant.

At the same time there were repeated requests from the people around Rawatbhata and they promised all possible help in carrying out the survey. Also, at the Bangalore meeting of antinuclear groups in April 1991, (See *Anumukti* Vol.4 No.6)there was strong support for the idea of conducting the survey. It was all these things together which helped us to decide to do the survey ourselves.

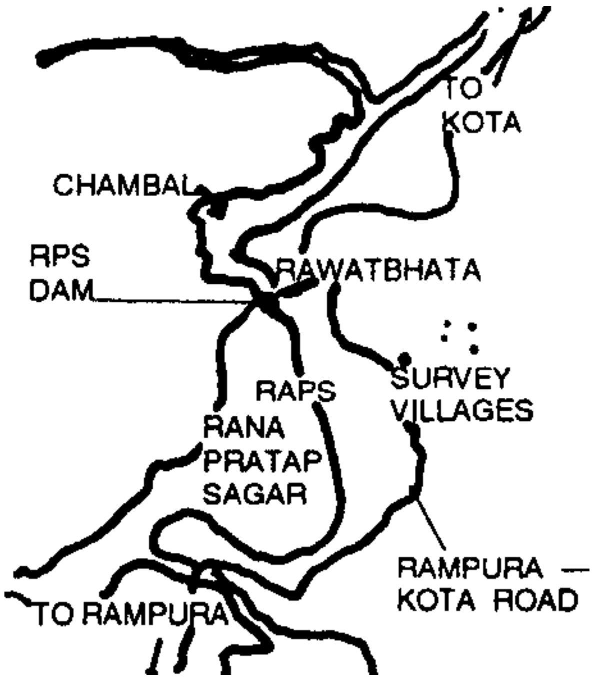
Not having done a survey ever before we were totally ignorant of the difficulties involved and had no inkling of the different kinds of organisational skills required. Now that the data collection part of the survey has been successfully completed, I don't mind admitting that without expert help, there is a good chance that we would have made a fine mess of things. But fortune favoured us and we had a very lucky break in the form of a chance meeting with Dr Leela Visaria of the Gujarat Institute for Area Planning. She not only helped in the design of the survey schedules but also sent two absolutely invaluable investigators to help conduct the survey. Shri Vinayak Dave and Ms Ila Mehta not only taught us a good deal but also took care to see that the survey was properly conducted and no household was inadvertantly left out.

The second great constraint was money. We toyed with the idea of applying for a research grant, but gave that up due to considerations of the time and effort involved in obtaining one. Then we had a happy thought. First of all reduce expenses to the absolute minimum and then share the burden so that no single entity gets too much of a load. It was decided that all investigators would volunteer not only their time and energy but also contribute their travelling expenses; boarding expenses would be the responsibility of our local hosts in the villages and at Rawatbhata and expenses such as publication of schedules and on medicines and other equipment would be borne by the *Anumukti* group. We made an appeal for both volunteers and donations and the response was overwhelming and far beyond our expectations.

Communications posed a severe problem since the survey was a joint cooperative effort involving many people most of whom lived far apart. We were not able to solve this problem satisfactorily and I think that if there is to be any future survey, central coordination needs to be done from some metropolis with adequate communications. Originally the survey was fixed for 11th of August, but that had to be postponed with very little notice. Even with just a week left there was no information if the survey schedules were printed or not; (they were not) or if any volunteer was coming for certain. Even the notice of postponement which we sent by telegrams did not reach some friends on time and three doctors from Indore and an investigator from Hoshangabad made a vain trip to Rawatbhata.

## The Terrain

The reactors are situated on the banks of Rana Pratap Sagar—which is the reservoir formed the dam of the same name on the Chambal. But for Rawatbhata township, the area is sparsely populated. The villages selected for the survey were Tamlav, Deeppura, Malpura, Bakspura and Jharjhani. The reason these villages were selected was that they lie in an East-North- Easterly direction from the plant and during the monsoons they are directly downwind. Except for Tamlav, which lies closest to the plant all the others are situated in a canyon called the Kundal. Deeppura and Malpura lie just in the beginning of the valley and the walls of the canyon are very close to these villages whereas Bakshpura and Jharjhani are further within the valley where it has opened up. There are other villages further down and there have been some reports of genetic abnormalities in children from some of these villages, but we did not include them in the survey, since to have done so, would have meant increasing the size of the population covered rather substancially. That would have made the survey well beyond our capabilities.



For the sake of comparison, we chose four villages Khetpalia, Dhoodhlai, Anandipura and Chandrapura near Rampura in Mandsaur district of Madhya Pradesh. These villages are a little more than 50 km distant from the nuclear power plant. Our reasons for selecting these villages was that they have similar size, and caste composition and are yet distant enough (we hope) from the nuclear power plant. In all we have covered a population of little less than six thousand—of these some three thousand one hundred are near Rawatbhata and two thousand seven hundred in the control villages.

The data that was collected provides information not only about health of the people but also things like where they were born, their educational status, employment, births and deaths within the last two years in the family, pregnancy histories of all women of child-bearing age, land holdings, fertilizer and pesticide use, animal holdings, nuitritional status... Thus, we hope not only to compare the health of the people in the near vicinity and those farther away, but also try to see what positive difference this giant nuclear enterprise made to the economic status and prospects of its neighbours. Isn't that what development is supposed to be all about?

## The Volunteers

There were three separate groups of volunteers but they all shared one quality—unbounded vigour and enthusiasm for work. It was indeed a revelation to see this kind of dedication. There was a group of eighteen college students from Delhi some of them post graduate students. They came in two batches, being unable to stay for the entire duration of the survey due to exams and other academic committments. The other group were students of the Rampura college and they did all the work in the control villages. There were two volunteers from Hoshangabad. Another group were eight doctors from different parts of the country who came for the last few days and helped by diagnosing the different ailments of the patients.

## The Nitty Gritty

Each and every household in the selected villages had to be identified first. To do this every house was numbered. Since we wanted the numbering to last for sometime in case a revisit was needed later, a small metal numbered disc was nailed to the front door of every house. Next a volunteer would write down the name of the head of the household and the total number of family members. A third person would at the same time draw a map of the village and place the house in the context of the map. All this had to be accomplished before any survey questions could be asked. Sometimes even this seemingly straightforward task could present unexpected difficulties. In Deeppura one day, all of us were astonished to see a group of people emerging from what looked like a field of tall corn. Further enquiry reveailed that we had completely missed four houses since they did not have any visible entrance, being surrounded by fields on all sides.

The numbering had to be logically consistenet and the logic had to be apparent to someone who had not participated in the numbering process. Remarkably, this was accomplished so successfully that later on some villagers approached us with a request for a copy of our list, because they said the village panchayat numbering was inaccurate and inadequate and they would prefer to adopt our more systematic approach.

For the filling of survey schedules, a team consisting of a male and female volunteer each was assigned houses according to the map. Quite often there would be nobody at home and repeated visits had to be made. We had to reach the village almost at dawn since by 7.30 A.M. most folk would leave for work. Thus the most productive times were early mornings and late evenings. Women in the family were the more crucial contact since only they could give us details of pregnancy history. Since women are the most overworked group, having to work both in the field and at home, answering our persistent and seemingly never ending questions was an additional impostion. But they cooperated most wonderfully and answered all the questions with exemplary forebearance. Sometimes, especially initially, there were communication problems due to the local Mewari dialect, but luckily most local youth did follow and speak Hindi and after a few days the volunteers had picked up enough to get by.

## A Typical Day

The day would begin usually around 4.30 in the morning since we had to getready and catch a bus or hitchhike on trucks to reach the villages early enough. The house numbering, listing and map making team would start on a new village while the scheduling team would fill schedules in previously numbered and listed area. Quite often, some villagers would think of us as some kind of undercover government agents, who had come to do 'Nasbandi' (Sterilization) and refuse to answer any questions. This happened more often in control villages since there the local medical authorities had very kindly and generously provided us with transportation. In such cases one had to explain to them what the survey was about and persuade them. At times this could be a severe test of persuasive skills. But finally, there wasn't a single instance where a family did not consent to answer questions. In some cases people mistook us for people who would provide them with land deeds. In these cases too, the false hopes had to be removed.

An air of uncertainty hung regarding lunch, though our hosts in Rawatbhata went to extraordinary efforts to provide us food on time. I don't think anybody ever went hungry, but lunch wasn't something you could count on.

A lot of time was spent walking large distances during repeated visits to a house whose residents had gone out for work. Vinayak had the most work, since he had to keep the whole thing coordinated, distribute new house numbers to those who were unable to locate people in their assigned houses and then keep track that no house was left out and that there was minimum duplication.

By the time we got back to Rawatbhata in the evenings, hitching a ride back on trucks, it was around 9 P.M., and all of us were dead tired. A bath and dinner and most of all sleep was a welcome prospect. However, before one could go to bed, one had to complete anything left unfinished in the schedules and also meet together to discuss the problems encountered during the day and take the next days assignments. We rarely managed to get to bed before midnight. Tommorow was already upon us.

Initially there was some culture shock, since city-bred volunteers had previously very little experience of extreme poverty and the lack of sanitation in the villages. But the warmth with which the villagers welcomed us soon won us over and we decided to stay in the villages to avoid the trasportation hassles. We were treated so royally well that we felt like 'baratees'. I ate some of the tastiest meals I have ever eaten.

But my best memories of the survey are connected with the truck rides back to Rawatbhata in which there was a lot of singing and some incredible feats of balancing on a fast moving truck without any kind of hand-holds. It was this spirit of bonhomie and unfailing good cheer that has established strong feelings of comradery between all of us.

Another positive side effect of the survey was that all the volunteers who came to Rawatbhata, none of whom had any previous strongly held antinuclear convictions, became ardent antinukes. The days spent at the survey counting diseases and watching stark poverty face to face and contrasting this scene with the monster development project nearby was the best possible education on the 'benefits' of nuclear energy. Any 'free' time was spent discussing all aspects of nuclear energy production and distribution. It was without doubt the best nuclear energy awareness camp that I have ever attended..

## A Special Problem

Despite earlier fears to the contrary, there was no direct attempt by the authorities at stopping the survey. However there were rumours and scares aplenty. Informers and CID's were a constant bother. Probably the reason their was no direct attempt at stopping the survey was the fortunately bad relationship between the RAPS big bosses (their overbearing attitude hasn't made them loved) and the local administration. However, this is just speculation on my part. The RAPS authorities did succeed in forcing the local administration to take some 'action'. This action essentially consisted in putting pressures on our local hosts. They were repeatedly harassed and questioned regarding the identity and the bona-fides of the volunteers.

## The Last Days

After completing the work at Rawatbhata we went to Rampura. By then the volunteers had become veterans and knew the codes in the schedules like the back of their hand. Unfortunately, this was the precise time that most of them wanted to had to return. They postponed their departure by a few days and helped in training the students of Rampura college in filling the survey forms. The work at Rampura, was just as busy as Rawatbhata, but it was easier and better organised. The local medical authorities had given us a vehicle, so getting to and fro from the field area was no longer such a hassle. These student volunteeers of Rampura, astonished me most of all. I suppose it is my elitist attitude, but I expected the volunteers from Delhi to do all the enormous amount of work they did and bear all the hardships involved without complain. But to find the same dedication and deligence in students from a small almost semi-rural college was a very welcome surprise.

While the work in Rampura continued, some of us had to get back to Rawatbhata, since the group of volunteer doctors was arriving. We wanted them to check all the cases which had been identified in the survey and confirm the diagnosis. But by then we were part villagers ourselves and invited ourselves to stay in the villages. The doctors not only went to every house diagnosing, they also had to distribute medicines and to listen to all kinds of complaints.

On the last day, September 22nd 1991, we requested The Kota Cancer Society and The Mahavir Vikalang Society to organise a cancer detection and a prosthetic camp. They organised two: one at Jharjhani and the other at Rawatbhata. There was great enthusiasm in all the villages about these camps and there was such a great rush of people that it almost overwhelmed the arrangements. A number of polio victims were provided with calipers and artificial limbs, a number of biopsies were conducted of people suspected of suffering from cancer.

Right now we are making the schedules computer ready. Once this task is completed we can put all the data in a computer and get correlations between different variables, and then finally the analysis can begin.

## Acknowledgements

There were so many people whose unstinted help and cooperation made the survey possible that it is difficult to know where to begin giving thanks. Unfortunately, I cannot publish the names of many, especially those who live in and around Rawatbhata because I do not put it past the RAPS authorities to 'punish' them for this effrontery.

The help given by Dr Leela Visaria and the Gujarat Institute of Area Planning, Ahemedabad in design of the survey was what allowed us to even think of undertaking the survey in the first place. The Institute is also doing the analysis.

Rajeev Singh, Ratna Mathur and Nivedita Menon of the Network to Oust Nuclear Energy, were responsible for recruiting the volunteers from Delhi. It was Ratna's will to see the survey through which gave us a new impetus at a time when we were feeling rather depressed following the first postponement. Rajeev and Ratna did so many things that it would take pages to just enumerate them. Similarly crucial was the role of Shri Ram Pratap Gupta of Rampura College, who not only made all the arrangements there but also had to convince the villagers of the desirability of having the survey. Ms Sudha Hardikar put us all to shame since she not only did all the work that was assigned to her but like Oliver asked for more!

I cannot complete this article without mentioning two names from Rawatbhata. They have already suffered so much harassment that they are immune to any further provocations. Jaan Mohammad Saheb not only opened the doors of his hotel to us, he opened the doors of his heart. And more than anything else it was the courage and the perseverance of Shri Ratanlal Gupta—Sarpanch of Rawatbhata, which carried the survey through.

# Lies, Damned Lies and Nucleocratic Explanations

The release of the September edition of "Eyewitness"-- *Hindustan Times TV's* videomagazine was a media event in itself. No event in recent memory has caused so much consternation among nucleocracts and their acolytes. The video showed a ten minute clip depicting a small sample of the health problems of the people around the Rajasthan Atomic Power Station (RAPS). There has been a veritable flood of press statements, explanations, denials, issuing of clean chits to RAPS administration by their bosses, and numerous articles in various newspapers. There is a common thread through all this outpouring and since it is part of a long running systematic campaign, it might be worthwhile to analyse its main points.

## Defense in Depth

The main idea which governs the safety of nuclear reactors is called defense in depth. The idea being that there should be so much redundancy in safety features, that if some particular feature fails to function, the safety of the whole system would not be treatened since some other safety system would work and there would be no leakage of radioactivity to the environment. A similar defense in depth strategy seems to be the governing principle in the attempt to plug the leaks of information to the general public.

However, despite all the redundancies, safety systems have been known to fail. In case of failure and the leakage of radioactivity to the environment, the governing principle is called damage limitation. The same priciple seems to be in operation with regard to information leaks. Like a game of chess, the arguments of the pronuke lobby have a discernable opening, middle game and an ending.

## No Health Effects At All Opening

Stout denial is the name of the game. The dominant theme of the pronuclear argument has been to deny that there are any health effects at all to be seen. It is all a figment of the biased antinuclear (read unpatriotic) imagination. Thus, we have

*"Atomic Energy Commission Chairman Dr P. K. lyengar strongly denied these reports as uninformed and in some cases part of a campaign to stop India from persuing its nuclear research and power generation."*
*(Hindustan Times* 17.9.1991)

Dr D.V.Gopinath, Director, Health, Safety and Environment Group at BARC, was more direct. According to him, *"these reports are based on conjetures and have no basis whatsoever."*
*(Hindustan Times* 17.9.1991)

To Dr K.S.Parthasarathy, the Secretary of the Atomic Energy Regulatory Board (AERB), and presumably the guardian of public interest vis-a-vis radiation, the health effects are nothing unusual and can be seen in every backyard.

*"On an average ten percent of all new born children will have some defects or the other. They include cleft palate and additional fingers. The birth defects recorded in the film can be seen in any village."*
(Dr Parthasarathy's letter in *Times of India 24.9.'9l)*

In fact, Dr Parthasarathy characterized the film

*"It does not raise an issue. It creates a seed of suspicion by deliberate propaganda. It can be dismissed in the light of current scientific information available."*
*Times of India* 13.9.1991

With the big guns booming like this can the acolytes afford to remain far behind

*"Cancer is nothing new to this region. In recent times cancer incidence has shown an increase all over, even in regions far away from nuclear power plants."*
(Dileep Bhatia - an engineer with RAPP in the Hindi Daily *Jananayak,* 14.10.'91.)

## Nothing To Do With Radiation Variation

The stout denial opening has become unteneble since the health of the people in villages around Rawatbhata is so extraordinarily bad that it shocks any unbiased observer. So any reporter who goes and sees for his or her own self cannot but help write about it. Also, newspapers publish pictures which are worth a thousand words and readers can make up their own minds just looking at the pictures. Therefore, the new variation of this opening is not to outright deny the existence of sickness but to claim that it is not due to radiation

. *"Scientific evidence points to no link what so ever between the reported health problems in the villages near RAPS and the operation of RAPS."*
Mr. S.L.Kati, Managing Director, Nuclear Power Corporation in *Finanacial Express* 21.11.1991

*"There is absolutely no evidence of radiation, in any dose, leading to polio-like deformities."*
R.Ramachandran's article "Who is Right About RAPS", *Economic Times* 27.10.1991
Editor's Aside:
I saw R.Ramachandran's article rather late to reply to it by sending a letter to *Economic Times.* If one wants to read only one pronuke piece on the whole Rawatbhata affair, this is undoubtedly the one to read. It is a committed nucleophile's polemic. The point that he is making in this quotation is that most of the photographs of deformities that have been publicised depict polio victims which according to him cannot be caused by radiation.

## Why Not in Hiroshima Counterattack

To firmly establish the fact that whatever health effects that may be visible, they could in no circumstances be due to radiation from RAPS, the next stage in the argument is a counterattack.

*The average doses to parents at Hiroshima and Nagasaki were 13,000 times more, than that to the parents in the Rajasthan villages. Since no genetic effects were found among the thousands of children in Hiroshima and Nagasaki, it is unscientific to expect such effects in the Rajasthan villages.*

Dr K.S.Parthasarathy in his letter to *Times of India* 24.9/91

If Hiroshima is too far, Mr Kati brings the point closer home

*"The reported health problems in a few villages around RAPS had not been evident beyond natural incidence in the plant workers or their families living in the adjacent plant township. It was to be noted that the limits for radiation exposure for occupational workers was 50 times that recommended for the public"*

Dr D.V.Gopinath is characteristically more direct. Giving details of the data collected from the RAPS hospital he claimed,

*'Among the 10,000 strong population of plant workers and their families, only 30 deaths attributable to cancer had occurred over the last 24 years. The incidence of only 1.3 cancer fatalities per 10,000 per year compared favourably with the national average of four to five cancer deaths for similar number of population."*

However, nobody plays this attack better than the Chief Suprintendent of RAPS Dr Ramanan

*"If the main mischief maker is RAPS, then why are the children of the plant workers not deformed? I have worked at the Madras Atomic Power Plant for 14 years and at Tarapur for nine years before I came here a few months ago. Logically I am receiving much more radiation sitting on my chair here than a villager at Jharjhani or Tamlav, but am I affected?"*

## Where is the Smoking Gun Middle Game

Having launched the attack, the next step is to deny that RAPS gives out any radiation at all! So how can it be blamed for whatever radiation related or not diseases that are to be found in its neighbours?

*"None of the two hundred and fifty shutdowns of the reactors has caused any radiation exposure to the public. Leakages do happen as in any industrial plant. Every drop of heavy water is collected. (Heavy water costs several thousand Rupees a kilogramme.) All leaks are contained."*

Mr Kati puts the same point in another way

*"Generally leaks in the nuclear power plants are misconstructed to be leaks into the environment, which is not true. For example, in the case of the South End Shield leak at RAPS, the leak was that of light water into the reactor building and not a leak to the environment. There are provisions for collection of leakages and its treatment to meet the regulatory requirements on effluent releases to the environment. Recovery systems were provided to recover heavy water leaks from the system into the plant building because of the radioactivity associated with the release and the cost of heavy water. **

## SCIENCE is my Lord and Protector Defense

However, as Vishwanathan Anand will tell you, it is not enough just to attack well. One cannot afford to forget about defense. Nucleocrats like saints have a halo around them which visible to their acolytes. This halo has the word science written all over it. Thus,

## So much for the Internationally Accepted Limits

*The following is a translation of a newsreport which was published in Nai Duniya-a Hindi Daily from Indore. A friend sent me the cutting but unfortunately it doesn't carry a date. This report needs a thorough investigation, because if true, it is a damning indictment of the RAPS administration and their masters the nuclear authorities.*

Officers of RAPS, in league with labour contractors have been toying with the health of young local labourers ignoring safety regulations. These contractors employ local youth during the shutdown of the nuclear power plant as helpers, feeders, supervisors etc. for maintainance and cleaning purposes. During the course of this work, these youth receive radiation far in excess of the limits set by international regulatory authorities. These young workers, who have no previous experience of working in radiation fields and who have no knowledge of the possible effects of radiation on health are ready to do anything due to their greed for money.

International regulations limit the dose of radiation to 2,000 mrem in one year. But there are some youths who have received 3,000 to 5,500 mrem during the course of a single day! This is not only in contravention of the international safety regulations but is also dangerous to health. The nuclear power plant records show the dose to be only 800 to 1,000 mrem. The actual dose received by the worker can be measured from the thermoluminescent-dosimeter (TLD) carried by the worker. The interesting point is that the contractor does not allow the worker to carry the TLD into the plant so the youth have no way of knowing the amount of radiation they have actually received.

Some youth who have worked during shutdown told us that they are made to word in areas with very heavy radiation. Some ignorant youth even discard their protective clothing while working inside the plant. They claimed that anyone receiving 800 mrem during a day receives Rs 1,600. But the contractor calls them for work again, so that the total cumulative dose can become as high as 5,500 mrem. However, only 800 mrem is recorded. To facilitate receiving the extra dose, the same worker is registered in the records with a different name each time.

every atomic energy functionary is by definition, a scientist, whereas antinukes are emotional and shrill. R.Ramachandran says it all

*"Scientists complain that what they have to say has gone unheard amid the strident campaign run by antinuclear activists."*

However, you may not be sufficiently in awe of the desi variety of scientist. Hence every single report does not fail to mention that the radioactivity releases (if any) are well within *"internationally accepted permissible limits,"*

But in case you are even immune to the immense prestige of internationaly renowned scientists and insists on measurements, Mr S.L.Kati has numbers in plenty

*"Environmental Survey Laboratory haa been in operation over the past 19 years. Radiation surveys as well as collection and analysis of 2,500 samples a year of water, soil, food, air and various other products, had been carried out in an area of about 30 km radius around the plant. The average annual radiation dose computed on the basis of actual air and water route releases over the past 17 years has been less than 5.5 mrem per annum, except 1988 and 1990, when it was about 8 and 12 mrem per annum respectively.*

Dr D.V.Gopinath puts it succintly

*The total radioactivity exposure from all routes, external as well as internal by way of food etc., received by an individual in the RAPS environment has been around 1-1.7 mrem per year. The total background radiation in the area is around 81 mrem per year and the exposure limit for the general public set by international regulatory bodies is 100 mrem per year.*

Nobody can say that pronukes are not independent of each other. Their figures certainly are!

## Universal Trinity Ending

Nucleocrats do not want to keep us guessing as to the cause of whatever health problems that exist. They already know all the answers! It is malnutrition, unsanitary living conditions and lack of health facilities that are the culprits.

Dileep Bhatia, RAPS engineer even has it on film

*"Village women collect drinking water from a pond where pigs are swimming and even a dead dog is floating! We have captured this on film."*

R.Ramachandran does not rush to his camera, when he sees a women drawing water. He prefers to quote the Central Water Commission

*If the poor health condition of the people reflects anything it is the dismal living, particularly sanitary conditions and near absence of any health care system. For example, the coliform count—as collected by the state government authorities—of the water that is generally consumed by the village population is in thousands and tens of thousands when potable water should have near zero count. The bacteria levels are also very high. These can be the cause of the general poor health conditions making them highly vulnerable to a whole lot of infectious and other diseases.*

## The Final Check

For the clincher, nucleocrats go back to their opening statement that there are no health effects at all, but now it is not they who are saying it but "independent" experts—doctors appointed by the Rajasthan government to look into precisely these reports.

Pathik Guha reports in *The Telegraph*

*"In fact, two independent reports by experts say that the stories regarding radiation malaffects on the population near RAPS are totally imaginary and facts being mentioned do not have even a distant relation to reality. Some highly placed RAPS officials say that the stories being circulated are "motivated". They maintain that villagers are "trying to blackmail RAPS". These people think that through such adverse propaganda they can force RAPS to provide them with more employment and free medical facilities."*

I do not intend to write a detail point by point rebuttal of this barrage. However, it is necessary to clear up some persistent misconceptions.

## Science as Scripture?

Is science merely the pronouncements of people who style themselves scientists, or is it an activity, a method of searching the truth? If the latter, than anyone who follows the scientific method is doing science, and anyone who doesn't is unscientific despite his or her 'eminence' and position in the scientific heirarchy. The basic tenet of the scientific method is observation. One just has to open one's eyes and see. Would Dr Parthasarathy have closed his eyes when Galileo was dropping his stones from the Leaning Tower of Pisa, because it would have been "unscientific to expect" both stones to fall simultaneously in "the light of current scientific knowledge?"

## The Clean Chit Industry

What needs to be done is simple and straightforward. First and foremost, help must be provided to the sufferers. Next step is to find out if there is an unnatural level of sickness. Once that is established, then one must try to investigate the cause of the problem. There need not be a single cause. It could be a combination of different factors. The cause may indeed be malnuitrition, unsanitary livingconditionsand lack of medical facilities. But these facors unfortunately are common to a lot of regions of the country and should not by themselves lead to uncommonly high level of sickness. It may be that all the deformed children have been born to fifty year old women who have married their cousins. But whatever be the cause, it has to be established using the scientific method. The scientific method does not stop at speculation. It provides proof.

Scientific practice also requires one other key ingredient. Whatever be the results they need to be openly published, so that others can examine them and question them and if need be refute them. "The guarantor of truth in science, is pluralism in research, free availibility of information and open critical debate."

Unfortunately, the two 'surveys' carried out by doctors appointed by the Rajasthan Government, do not come in the category of science but instead belong to the clean chit issueing industry. Their work has no scientific value since they have not published it. Hence their methodology of obtaining data remains a mystery. In our country there is no dearth of people who will issue clean chits at the drop of a hat to anyone and especially to someone as rich and powerful as the nuclear establishment.

### Hiroshima Red Herring

Whenever one makes comparisons, care has to be taken that the comparison is being done between comparable objects. This is the old apples and oranges problem. Thus, when health of two populations is to be compared to determine the effect of some pollutant, care must be taken that other factors that affect health, are similar. It makes no sense to say that permanent workers at the nuclear power plant, a well paid, well fed, well cared for group does not show similar symptoms as poor, malnourished, unclean water drinking villagers. It would be a great surprise if the health condition of these well to do people was the same as that of the poor villagers. In fact, the claim that cancer deaths in RAPS hospital are much less than the national average is a pointer in this very direction.

Similar is the case of the Hiroshima and Nagasaki survivors. These people are not an ordinary sample of the general population. They had not only survived the bomb, but also its aftermath—a nation devastated by war, rampant disease, a very severe winter and total disruption of civil supplies and medical facilities. To make an assumption that the survivors did not have a stronger constitution than the non-survivors is absurd. This skewed selection in Hiroshima data has obscured the fact that there are other effects of radiation besides cancer. One effect that has been well established, especially after Chernobyl is damage to the immune system. And this immune system damage does result in an abnormally high level of sickness, whether it be polio, T.B., or Anaemia. (See Dr Alice Stewart's article in Anumukti Vol.4 No.3.

A point that needs to be made is that there are many other people living in Rawatbhata township besides RAPS workers. These people are a comparable group to the people living in the villages nearby. A survey can establish whether the assertion that the health effects are visible only in the villages and not in Rawatbhata is true or not. However, nobody has done it. The repeated assertion by nucleocrats that there are no such effects has no basis in experiment.

However, as an aside I would like to make some comments on this very low rate of cancer mortality in RAPS hospital, since it does illustrate the nuclear mindset rather well. The number is a fraud. It would make sense if each and every member of RAPS staff or any of their family members would go only to this facility in case of terminal cancer and go nowhere else. That is obviously not the case. When somebody falls seriously ill, he or she is referred to specialist hospitals in metropolises. Thus, the number and the cancer mortality rate paraded with so much fanfare represents nothing at all. But, unashamed at participating in this fraud, nucleocrats go one better. They calculate the mortality rate by dividing from 1967 when the hospital opened rather than from 1973 when the plant opened. As they say in computerese: garbage in; garbage out.

### The Burden of Proof

Although villagers have taken the initiative and have gotten a survey carried out, I think it is a shame and a pity that in our country, the burden of proof of injury falls on poor victims of pollution rather than on the polluters. Similar is the case of Bhopal and numerous other places. Unless we can shift this burden from the victim to the pollutr, we would remain an unjust and uncaring society.

# Down's Syndrome Higher Near Nuclear Plant

A Canadian federal government study has found puzzlingly high incidence of Down's Syndrome in Pickering and Ajax, two communities near the Pickering nuclear generating station.

The study, done for the Atomic Energy Control Board, tracked congenital abnormalities in a 25 kilometre radius around the nuclear plant from its startup in 1971 to 1988. The study was done by Ken Johnson, head of the birth defects section at Health and Welfare Canada. Mr Johnson is also responsible for the national data base that records birth defects, the Canadian Anomalies Surveillance System.

Although the study concluded that infant mortality and incidences of most types of birth defects are no higher near the plant than the average elsewhere in Ontario, Down's Syndrome rates in Pickering were *86* per cent higher than the provincial average and in Ajax 46 per cent higher. The study was undertaken after widespread media coverage three years ago of a birth-defect study by David McArthur, a York University graduate student, that raised a possible connection between childhood abnormalities and releases of tritium from the Pickering station. (See *Anumukti* Vol.2 No.5 April 1989)

The research on birth defects adds another dimension to the debate over the safety of living near nuclear facilities. In a study released in June by the Atomic Energy of Control Board, (AECB) childhood leukaemia deaths in Pickering were found to be 34 per cent higher than the provincial average, but the researchers concluded the finding might be due to chance.

This is not the only report of a connection between radioactive contamination and Down's Syndrome. Earlier, Dr Patricia Sheehan, a Down's Syndrome specialist from Ireland had shown a similar connection with respect to the fire at the Windscale nuclear facility in England in 1957 (see *Anumukti* vol.1 no.4) Also, the West German Institute for Human Genetics had detected a significant increase of Down's Syndrome in children born in January 1987 in West Berlin following the Chernobyl nuclear disaster in April 1986. There has been a extensive work carried out by Dr Kochupillai and coworkers and later on by the group headed by V.T.Padmanabhan, which has shown a connection between the high backgoround levels of radiation in the monazite bearing sands of coasts of Kerala and Down's Syndrome. However, the Canadian study is the first which links 'harmless' routine releases from nuclear power plants with this condition. It is also the first such study conducted by an official nuclear energy authority anywhere in the world, which admits that a problem exists.

Ontario nuclear power plants routinely release small amounts of tritium. According to a statement issued by AECB, these releases result in a very small radiation doses to the population in the vicinity of the plant. The amount being in fact less than one hundredth the dose received from naturally occurring sources of radiation.

# Narora: New Era of Nuclear Irresponsibility

There was a time when nuclear power plants, missile flights, large construction projects and all such fanciful white elephants were "dedicated" to the nation with a ceremony befitting the birth of a son in a royal household. The Prime Minister would do the dedication while the high and mighty would be in attendance. The whole event would be conducted with extravagance. A fling to commemorate the lavish waste of public funds which had been the hallmark of the project in the first place.

Unfortunately, nowadays we live in the age of uncertainty. One doesn't know for sure, that the august personage one invites for the grand event would still be holding his or her exalted office by the time the great day comes around. One doesn't even know for certain that the button that is pressed to signify the start of operations, would not result in an explosion. Being men of the world, nucleocrats have decided that discretion is the better part of valour, and have opted for 'simple' opening functions. The opening of the second unit of Narora Atomic Power Station was announced by Dr P.K.Iyengar, the Chairman of Atomic Energy Commission, at a press conference.

The earthquake of 20th October, which devastated vast areas of Uttarkashi and Chamoli districts of Uttar Pradesh, put a damper on the festivities. It was yet another grim reminder of the fact that this region is geologically unstable and is prone to tremors of moderate to severe intensity. Whether these occuranees become calamities or not depends not, only upon the magnitude of the tremors but also on the architecture and lifestyle of the people inhabiting these areas. Japan and California are also regions of geological instability and yet earthquakes there of similar intensity do not cause as grievious harm. The Japanese in particular have for a long time designed light structures for their dwellings and places of work which do not result in serious injury even in case of collapse. One simple and sensible precaution that any government could easily undertake would be to insure that no structure which could cause widespread devastation in case of failure was ever put up in a region prone to 'natural' calamities.

## Politics Predominates

However, to expect sense to prevail over political considerations in India, is to expect the impossible. When the idea of the Narora project was first mooted in 1974, the late Dr A.K.Ganguly, who was one of the members of the site selection committee, strongly objected to the choice. However, more obliging nucleocrats, ever eager to please their political masters, argued that if nuclear power plants were to be excluded from a region on the basis of seismic unsuitability alone, than more than two thirds of the country would become out of bounds for reactor construction. With the change of government in 1977, the Narora project went into cold storage. Although Shri Charan Singh was very keen to have the project approved, he did pay heed to the warnings voiced by technical experts. However, once Smt Indira Gandhi returned to power in 1980, she was especially interested in the project as a means of demonstrating to the farmers of western U.P. her clout by accomplishing a task which even Shri Charan Singh had been unable to do. All technical objections were brushed aside and the project was on its way once again.

## Earthquake Proof Design?

Luckily the recent earthquake which measured 6.1 on the Richter scale was not in the near vicinity of Narora. The epicenter was more than two hundred kilometres away. According to Dr S.L.Kati, the Chairman of Nuclear Power Corporation, instruments at the plant site designed to measure ground accelaration, recorded a reading of O.025g. Dr. Kati claims that Narora can withstand tremors even ten times as strong. He has in a letter to newspapers tried to clarify the seismic design concept underlying Narora. He says that "the concept of the plant takes into account two levels of earthquake; one is known as the operatingbasis (0.15g) which is expected to occur once during the lifetime of the plant and at which time the reactor is expected to remain operational. The second level (0.30g)indicates the maximum magnitude at which all safety systems are expected to be fully functional and the reactor shut down safely. The seismic instrumentation at Narora is set to shut down the reactor at a conservatively low level of O.lg. The recent recorded ground accelaration of 0.025g at Narora is very much lower than this value. Under international procedures and regulatory requirements, the level of ground accelaration that was felt at Narora on October 20, does not call for an automatic reactor shutdown or any special examination of the plant and equipment. No visible damage to structures in the vicinity of Narora was reported and there was no disruption in telecommunications, water supply, electrical and power systems." So far so good! One hopes and prays that the Narora power station never has to undergo an earthquake of an intensity which would severely test all its safety systems. However, the present earthquake does raise certain questions which need to be seriously addressed.

- The assumption that a nuclear reactor has been built to withstand earthquakes of a particular intensity, is based on computer modelling, which has been found defective in the past. For example, in 1979, the U.S. Nuclear Regulatory Commission temporarily closed five nuclear reactors when it discovered that the engineers had underestimated the stresses that piping in the reactors' coolant system might have to withstand in the event of an earthquake. Other nuclear plants, such as the Humboldt Bay reactor in northern California, have been closed after years of operating because they were belatedly found incapable of withstanding a severe earthquake.

- The safety of nuclear reactors also presumes that individual components like piping, valves, electrical circuitry, etc., have been specifically engineered to meet desired seismic specifications. There have been persistent and serious allegations made by Dr Dhirendra Sharma that substandard and counterfeit parts have been widely used in the construction of Narora reactors. Nucleocrats have chosen to just ignore these charges rather than to publically conduct any inquiry into them.

- The 'science' of earthquake prediction is yet in its infancy. Although the design basis earthquake is presumably based on the data gathered over the last hundred years in the region, there is no guarantee that the next earthquake would not exceed in intensity anything previously experienced and hence the value which the engineers have guessed for it. Even in California, geologically the most studied region on earth, there have been earthquakes in places and of magnitudes which have surprised experts as little as two years ago. In fact, a one mile section of a freeway in San Francisco collapsed following an earthquake which measured 7.0 on the Richter scale in October 1989. An earthquake of that magnitude is certainly possible in the Narora region. It is what Dr Kati assures us, that Narora has been built to withstand.

- Of even greater concern than the safety of the reactor containment building are the radioactive waste storage pools situated near the reactor site. The waste stored in these pools can contain more radioactivity than found in the reactors themselves. Since, these pools are designed as temporary stuctures, their construction vis-a-vis seismic criteria is more lax than for the reactors themselves.

- The emergency evacuation plan developed by the nuclear authorities does not even consider the possibility of a nuclear disaster following an earthquake. It assumes that thousands of people can be evacuated quickly and in an orderly manner. Even in the best of times this is unlikely to happen, but just after an earthquake, with damaged roads, overworked and impaired communications systems, loss of electrical power and panic amongst the ranks and also in the populace, it is surely impossible.

- Lastly and most importantly, Narora is located on the banks of the Ganga. The Gangetic plain is the most populous and fertile region of the country. We cannot afford a Chernobyl anywhere, but in Narora it would mean the end of our civilization.

## The Great Indian Megawatt Vanishing Trick

For the last many years one has been hearing time and time again that Narora is a standardized design: the forerunner of other reactors of 235 Megawatts capacity each. The advertising blitz launched last year "Nuclear Power and you" also says this and in fact goes on to add capacities of various non-existant plants to show how they would all together contribute 10,000 Megawatts by the year 2000 A.D. However, all the newsreports regarding Dr. Iyengar's press conference opening Narora-2 stated very clearly that its capacity was just 220 Megawatts. This figure of 220 MW was mentioned at four different places in one newsreport. The reports in fact mentioned that the capacity of the previously -opened Narora-1 was also 220 MW. That this figure is not just some inattentive reporter's slip or the ever convenient printer's devil, gets confirmed from a signed article by the Chairman of the Nuclear Power Corporation, Shri S.L.Kati in the *Financial Express* (21st November, '91) which too mentions the same figure of 220 Megawatts. He if anyone ought to know.

This loss of 15 Megawatts is no joke. Since Narora is the standardized design, other reactors now under various stages of construction in different parts of the country would also presumably be of 220 MW capacity. This would mean a total cumulative loss of 120 Megawatts from the nuclear generating capacity. That is more than the capacity of RAPS-1!

## Cheapest Nuclear Energy in the World!

Another point to emerge from Dr Iyengar's press confere nce was that Indian nuclear power plants cost roughly $650 per kilowatt to build while the international cost of a nuclear power station is around $2,000 per kilowatt. Capital costs are the main component of costs of nuclear electricity since as the nucleocrats keep telling us the maintainance cost are small—"it takes only a few truckloads of uranium a year to run a nuclear power station instead of a whole trainful of coal every day it takes to run a coal-powered plant." With a cost advantage of almost three times, the Department of Atomic Energy is producing what has to be the cheapest nuclear electricity in …d. I wonder …re is no …de rush of or- …ndian expertise in nuclear power plant construction. Either no body believes these wonderful figures, or else outsiders are fearf ul of plants that loose 15 Megawatts of capacity at press conferences. Perhaps they look at overall plant performance and decide that however cheap these reactors may look at first sight, they are worthless since they hardly produce a quarter of their capacity, (See Box)

## A Nuclear Quiz

The question concerns two Indian reactors. One is a 220 MW reactor which opened in 1973. In 1981, cracks were discovered in its end shield. It was shut down for repairs for three years briefly opened and had to be again shut down. It was called a prototype and was almost written off, but heroic efforts have revived it. However, for safety reasons, it has been derated and is not allowed to operate beyond 90 MW There is also the other reactor. The very latest (before October 24,1991) 235 MW reactor which opened in March 1989. It probably had some initial problems (what are called teething troubles by doting nucleocrats) but these were overcome and it has been in commercial production for more than a year now. Its design is the standard which subsequent reactors in the country would emulate.

### Question:

During the year from July '90 to June '91 which of these two reactors produced more electricity?

### Answer:

The correct answer is that they were both awful, Narora-1 did produce a little more electricity than RAPS-1, but both together produced less than either of the units at Tarapur. The plant load factor was just 25 %.. In July and August '91 they both did not produce a single unit.

# Fire Delays Kakrapar Opening

During the budget session of the parliament, the government had informed the house regarding the imminent opening of unit-1 of the Kakrapar atomic power station. It was said that the unit would become critical latest by December. Some articles eulogising nuclear energy also appeared in Gujarati newspapers. The role of nuclear energy in mitigating the chronic power shortage in Gujarat was stressed. They all greatly praised the heroic work done by the engineers and the construction workers who had managed to complete the construction in just seven years instead of the sixteen that it had taken Narora. As a matter of fact, construction workers had struck work, demanding bonuses for having completed the construction so quickly. The authorities did give in to these demands.

Now it seems that these annoncements and press briefings may have been somewhat premature. As the saying goes, never count your nuclear chickens before they are hatched. A fire broke out in the turbine room during a routine preliminary test. The test was being carried out taking power from the Ukai hydroelectric power station. The engineer on duty ignored warning signals and hence the fire is being attributed to human error. The fire has caused extensive damage to transformers and the whole electrical circuitry in the power station. The authorities were tightlipped regarding whether the fire had caused damage to the control room of unit-1. Visitors to the plant after the fire were shown around all other parts of the reactor, like the calandria etc., but received only excuses when a request to be shown the control room was made. They were told that the "fire had started in a structure in between the turbine room and the transformers. The only structure in this location was the control room. It took more than a week just to restore electricity supply to the station following the fire. The whole area around Kakarapar, including the workers' colony at Moticher remained in darkness all this while. Estimates of monetory damage vary from Rs 4 crore to Rs 36 crores. These numbers are not very relevant, since the interest charges for a few months on the hundreds of crores that Kakrapar has cost would themselves be comparable to these amounts. And there is no doubt at all that this fire has delayed electricity generation from Kakrapar by well over a few months. If one adds to these costs the cost of the lost production in downstream industries because of the delay in the commissioning of the plant, the loss to the nation due to the fire could be well around Rs 100 crores.

Normally one would expect, with losses of such magnitude, that the press in Gujarat would be publishing reports after reports and discussing this incident threadbare. Unfortunately, normal criteria do not apply with sacred cows like nuclear energy. The only report that appeared was a small inconspicuous bit on an inside page of *Gujarat Mitra.* The only 'National' newspaper to publish an account was *The Economic Times,* and it did this almost, a month after the event and most of that report consisted of reassurances from the plant authorities that no nuclear materials were involved in the fire.

This fire has caused great consternation amongst the people living in villages in the vicinity of Kakrapar. They had for long been fed "facts" by nuclear authorities: like accidents in a nuclear power plant are rarer than meteors falling upon houses. Therefore, a major accident even before the formal opening of the plant has been a cause of severe anxiety.

Another issue which is agitating some villagers in the nieghbourhood is that the authorities are in the process of raising the height of the Kakrapar dam. This is being done, because it seems that the water presently available in the dam would not be sufficient to meet the current needs and also simultaneously meet the needs of the nuclear power plant as well. What is still somewhat unclear is whether this realisation has dawned just now or whether this was part of an old plan. It is quite possible that the water requirements of the nuclear power station could never have been mot by the old dam, but the authorities had kept the local people in ignorance of this fact. Quite often one hears "Where were you till now" and "why did you not protest before these hundreds of crores were spent" as criticism of protest actions. All such criticism fails to take into account the nature of the authorities who love to keep the public in the dark regarding their plans till the last possible moment and then plead that the time for protest is long past.

# Peringome: People March Ahead

People turned up in large numbers from different parts of Kerala to participate in the march organised by the Peringome Antinuclear Forum. The 70 km march, started from Peringome on 1st of November, 1991 and ended at the collectorate at Kannur on the 4th of November. It demanded from the government that it scrap the proposal to establish a nuclear reactor at Peringome.

The agitation against the Peringome plant started on 26th of April, 1990. On 6th of August, 1991, thousands of people had picketed and paralysed work at five government offices in Peringome. But despite all this, the authorities had remained unconvinced and in no mood to abandon the proposal. They had continued to abandon the proposal. They have instead, gone ahead with the construction of the Kakkadavu dam, which would provide cooling water to the proposed reactor.

The most remarkable feature of the Peringome struggle is the fact that it is not aimed simply at avioding a nuclear reactor at Peringome. The people are not only against siting the plant at Peringome, but they oppose the siting of the plant anywhere else in Kerala, or in India or for that matter anywhere in the world. Thus, although the actions are local and site-specific, the slogans used are global and against nuclearisation everywhere. The campaign has stressed the economic, ecological and ethical questions involved in the nuclear option.

The other remarkable feature of the agitation has been the wide participation cutting across all political barriers and petty sectarian biases which have been so important in Kerala till now. All participants have come voluntarily of their own will and convictions; there have been no party shepards to flock the sheep. Artists, writers, professionals, media people and ordinary folk joined hands in solidarity and made the march a memorable experience.

The march was inaugerated on 1st of November at 11 A.M. by Mr M.T.Vasudevan Nair, an eminent writer and film director. He told the gathering, "We have to say an emphatic NO to nuclear power, not for our own sake, but for the sake of future generations. We have no right to make their lives miserable and unlivable." Shri M.P.Veerendra Kumar, managing director of *Mathrubhoomi,* demanded that the government publish a white paper on its nuclear projects and that the Atomic Energy Act of 1962 be scrapped. Scientists, however clever and intelligent they may be, should not be exclusivly entrusted with the authority of taking decisions involving severe risks. Bishop Dr. Paulose Mar Paulose, champion of liberation theology and a renowned orator in Malyalam, presided over the inaugeral meeting. He pointed out that if democracy has to have any meaning, people should have active participation in the decision making process and it is the people's will that should pervail. The minority decision to impose a nuclear power plant on the people militates against the very spirit of democracy.

Antinuclear friends from outside the state had also come to demonstrate their solidarity with the struggle of the people of Peringome, and their presence added a unique momentum to the entire campaign preceding the march. Dr. Sanghamitra Gadekar of the *Anumukti* group and Shri Rajeev Singh an activist from Network to Oust Nuclear Energy in Delhi, spoke about their experiences at Rawatbhata, Kakrapar and Narora. Dr Sanghamitra said that the people of Kerala are lucky because unlike the people of other states with nuclear power plants, they already have before them the bitter experiences of nuclear energy production.

There were receptions organised by the local people all along the route of the march. Several teams of actors put up street plays at various centres. Some organisations had raised huge banners along the route greeting the marchers. Besides continuous slogan shouting, the marchers enthusiastically sang songs and recited poems. Copies of a Malyalam booklet, *Nuclear Power: False Promises, Horrible Realities,* were distributed all along the march.

Ms Nandini, Ms Asha, Dr C.K.Jagdeesh, A.K.Ramakrishnan, N.Subramanium, T.S.Ravindran, K.Ramachandran, A.Mohan Kumar, T.Ravithran and several other activists explained the potential threat caused by the Peringome plant.

There were three overnight halts during the march. Each evening there were public meetings organised at each of the venues. The first night the halt was at Payyanur, the second at the Taluka headquarters at Thaliparambha and the third night at Puthiyatheru town. People gathered in these meetings in very large numbers. Among the speakers besides those already mentioned were editor of *Ankh* Prof John C Jacob, Sathyam Mokeri M.L.A., veteran freedom fighter Shri A.V. Sreekanta Poduval, K.T.Kunhikannan, Kasturi Devan, Ashraf, Rajeev Kumar and other leaders of organisations.

On the last day of the march, a charter of demands was submitted to the distric collector asking that the government declare in unmistakable terms that the nuclear plant would not be set up. The renowned poetess Sugatha Kumari administered an oath, "In order to guard the future generation's right to live, we shall struggle against the nuclear plant till our breath lasts and till the last drop of blood is within us." Later, a valedictory meeting was held at the Stadium Complex, Kannur. The meeting was presided by Dr T.P.Sukukaran, noted playwrite, educationist and social worker. It was addressed by luminaries like Dr Sukumar Azhikode, Bishop Rev. Sebastian Valloppalli, Sugatha Kumari, K.V.Surendranath D.Vinayachandran, C Unni Raja, and Dr Sanghamitra.

There is no doubt that the march and the campaign has renewed confidence in the people and has made them more determined than ever to resist the atomic menace.

*K. Ramachandran*
*Peringome Antinuclear Forum*
*Payyanur 670 307*
*Kerala*

## Antinuclear Forums

An Antinuclear forum was formed at Thrissur on Nov2, 1991 under the chairmanship of Prof K.Satchidanandan, poet and critic. Mr P.K.Venugopalan is the convenor.

The forum shall educate people at the grass-roots level, so that a new perspective of development can be achieved. As part of this programme an antinuclear training camp shall be held in February to train activists.

Till now, 12 antinuclear forums have been formed at panchayat level. Work is going on to form units in other panchayats of the district.

## LETTER BOX

What are the other nations of the world doing and thinking with respect to the producton of nuclear power? Recently in The Times of India, there was an article on the son of Field Marshal Romel, who is now the mayor of Stutgart. The article says that this German town has two nuclear plants; I have read in *Anumukti* that the most recent tendency in the developed countries is to frown upon and discourage new nuclear plants, because of the dangers of radiation and because of the problems associated with the disposal of radioactive wastes. I think it would be worthwhile to publish a survey of the nuclear plants already established in developed countries of Europe and North America and in Japan. Japan would be of particular interest since it is known that it has no sources of coal and oil.

All our nuclear plants like Kaiga are situated far away from inhabited areas, but the Stutgart report shows that the plant there is situated close to the city. Can *Anumukti* organise a conference in

India of the representatives of these countries for a discussion on this subject? In a world of progressively depleting fossil fuel resources, the importance of the subject of peaceful utilisation of nuclear energy should be obvious.

I would also like to draw your attention to the letter published in *The Times of India* of 24th September, 1991, under the title "RAPS Safety", bearing the signature of Dr K.S.Parthasarathy, Secretary, Atomic Energy Regulatory Board. On a similar complaint published in *Anumukti* last year by Sanghamitra Gadekar, I had sent an enquiry to the Atomic Energy Commission in New Delhi. That enquiry has elicited no reply uptil now.

*Shri R.K.Patil*
*Civil Lines*
*Nagpur*

## Editor's Reply:

No new nuclear plants have been ordered in the western part of the presently united Germany for more than fifteen years. Nobody, not even the Indian nucleocrats is advocating that new nuclear plants be built near the cities due to the risk involved in a catastrophic accident. Thus, the fact that there are old nuclear plants not too far away from some cities in Western countries in indicative not of the safety of nuclear energy but rather of the ignorance and arrogance of nucear establishments of these nations in days past.

Not all our nuclear plants are situated far away from densely inhabited areas. The latest addition to the nuclear family, Narora, is situated right in the midst of the most populous and fertile regions of the country. Even where nuclear plants have opened in sparsely populated regions, like Rawatbhata, over the years, people from other parts migrate to the region to provide services to the workers' colony. In a few years the area no longer remains uninhabited.

A nuclear industry journal, *Nuclear Engineering International*, does publish country wide surveys of nuclear establishments in various parts of the world. This journal is available in libraries of some engineerng colleges and might be awailable with the National Institute for Research in Environmental Engineering in Nagpur.

As far as your proposal for a conference on the peaceful uses of atomic energy is concerned, I don't see any merit in it, even if *Anumukti* had the capacity to organise such an event. In a world of depleting resources, the future lies not in persuing fossilizing technologies, but in using less, wasting nothing and working towards self-sustainable technologies and lifestyle.

◆

I was pleased to read about your bi-monthly journal on non-nuclear India, in the July/August issue of *Good Life*. I am a perma-culturist. Permaculture advocates the planning and design of totally self-sustainable, independent systems which generate all the five F's (food, fodder, fuel, fertilizer and fibre) within the system by employing common-sense, environment friendly technology. In energy generation, pefmaculture advocates conservation and waste recycling.

But more importantly, I am a natural hygienist-I and my family are enjoying the benefits of a drugless life for the last four years. We have slowly moved away from a lot of artificial things and are now planning to settle down on a farm of our own. I am therefore a staunch opponent of the nuclear power (for whatever purpose) lobby.

Mr Kowta Ramanand
No 5, Geet Gunjan Plot 1198
L.B.S.Marg, Mulund(W), Bombay
400080

## Subscription Rotes:

Rs. 25/- per year South Asia
U.S.$15/- per year or equivalent in other convertible currencies (airmail overseas)
(Rs.300/- per year if paid for in India)
Rs.250/- for life (only within India)
Please add Rs.6/- for cheques
Drafts should be drawn on State Bank of India, Valod (0531)

Editor: Surendra Gadekar

Subscriptions, donations, manuscripts, inquiries regarding circulation, etc. should all be addressed to:

Editor Anumukti
Sampoorna Kranti Vidyalaya
Vedchhi, Dist:Surat, 394641 INDIA

Published by S.Gadekar for Sampoorna Kranti Vidyalaya and printed at The Parijat Printry, Ahemedabad

**PRINTED MATTER** **BOOK POST**

# ANUMUKTI

## A Journal Devoted to Non-Nuclear India

**Volume 5 Number 3** December 1991/January 1992

> *Where the clear stream of reason has not lost its way in the*
> *dreary desert sand of dead habit;*
> *Into that heaven of freedom, my Father, let my country' awake.*
>
> ***Rabindranath Tagore***

# Anumukti Cycle Yatra

Nuclear power as an idea that can change the world has long been dead. There are no visionaries like Homi Bhabha or Vikram Sarabhai around: people who believed in what they were doing; who saw atomic energy as an instrument that would lead us out of poverty, ignorance and disease—that would lead to a tetter tommorow. Today, for most within the establishment, it is just a job. The stream of reason has indeed lost its way into the sands of habit.

Chernobyl did not kill nuclear power. It is a symptom of death rather than a cause. What killed the nuclear idea, is the fact that whatever power it does deliver, (and compared to its tall claims, it produces peanuts), it delivers to too few hands. Power corrupts. In a world striving for freedom and democracy, the dead weight of this corrupting source is too much for any society to carry.

But then, why is *Anumukti* flogging a dead horse? Why not let it fell down of its own contradictions? The reason is that though the idea is dead, the habit is not. Thus, we have the Indian nuclear establishment blithely continuing its disastrous course. Instead of taking the golden opportunity provided by the Soviet withdrawal from Koodankulam for some introspection and rethinking, we have them all set to build there the as yet undesigned 500 MW CANDUs. Despite the mounting evidence of unacceptable health effects, we have them propose a new nuclear plant in the densely populated state of Kerala. Truly, it is difficult for those who have once tasted power, to give up that power and the associated perks without a fight. And people will be ready and willing to fight only when they understand the issues throughly.

It is for this reason that *Anumukti* and the Sampoorna Kranti Vidyalaya propose to embark on a cycle yatra from Kakrapar to Peringome to raise people's awareness of the perils of nuclear power generation and to bring to their notice the latest horrific information about the health effects being suffered by the people living in villages around Rawatbhata. But the purpose of the yatra is not just to warn the people against the nuclear dangers but also to form close links with various people who are the victims of 'development', so that an alternative model of real development can emerge.

The cycle march would begin around the 20th of March from Vedchhi and proceed via Vansda and Valsad to Tarapur and from there on to Bombay. From Bombay it would go down the coastal highway to Goa, into Uttar Kannada near Kaiga and from thereon to Manglore, reaching Peringome around the 24th of April. The dates are still tentative and a final timetable will be decided after all the arrangements are complete. This route would bring us in proximity of many existing and proposed nuclear installations Kakrapar, Tarapur, BARC at

Chembur-Bombay, Jaitapur, Kaiga and Peringome. One of the purposes of the yatra is to form close links of friendship amongst people who are all suffering or are being threatened by the nuclear menace.

Obviously, the yatra would not succeed in its objectives unless it was able to draw upon the willing cooperation of large number of different activist groups along the route and elsewhere. We want you to join the yatra. You can do this in various ways:

- Coming yourself or sending some person to join the group of cyclists for the whole distance or some previously defined parts thereof
- Sponsoring a cycle or making monetory contributions towards the cost of the yatra
- Arranging for the stay and boarding of the yatra at destinations along the way
- Translating and publishing written material about the yatra and about nuclear power
- Help in arranging public meetings and slide-shows, press conferences and meetings with local media personalities

There is a proposal to limit the number of volunteer yatrees to twenty, since otherwise it may become too big and perhaps an unwelcome burden on the local hosts. We would like to invite participants from all over the country and especially from the states which lie on the route of the yatra to join in for the whole duration. Therefore, all those who might be interested in joining the march should write to us at Vedchhi as early as possible.

The antinuclear forum at Peringome plans to hold a convention to commemorate Chernobyl Day on April 26 and the yatra would conclude there.

The yatra would need a lot of preparatory work. This would involve not only establishing contact with groups and individuals on the way but also

- Design and preparation of a transportable poster exhibition in all the local languages
- Preparation and printing of pamphlets and written materials explaining the menace of nuclear energy and the purposes and the programme of the yatra in all the local languages.
- Preparation of songs, a drama and some short skits and street plays depicting the threat of nuclear energy

To do justice to all this we will be holding a ten day preparatory camp at Vedchhi starting on 10th of March, 1992. All those who can donate their talent and time during this period, are most welcome to come to Vedchhi.

Most of all, we would like *Anumukti* readers to join us by making this yatra your own, keeping in touch and by letting us know what all we ought to do to make this a success and by suggesting names of contact persons along the route whom you might know and we don't but ought to.

## From The Editor's Desk

"*Anumukti* has lost its balance," a regular reader, Girish Sant from Pune recently told me. "It is just full of accounts regarding the health effects of radiation but it does not carry anything on energy planning and alternatives." Unfortunately, there is a lot of merit in this criticism. *Anumukti* does need to present a comprehensive view, and there are many facets to the nuclear question. The problem of health effects has dominated most recent issues of *Anumukti*, because I think that it is only the irrefutable and mounting evidence of unacceptable health effects that would put a final finish to the nuclear madness. I have sometimes tried to get around this problem of comprehensive coverage by having separate numbers highlighting a specific issue each time, and in fact, Vol.2 No.4 did deal at length with the issue of energy planning and conservation. However, this arrangement is not very satisfactory since it actually is an arrangement which makes for an 'unbalanced' *Anumukti* every time. I would like to hear more (or more accurately in most cases, hear for the first time) from you regarding your views on how to adequately tackle this problem of balance.

An article which might surprise regular readers of *Anumukti* is the announcement, SUN DAY 1992: A Campaign for a Sustainable Energy Future. At first sight this campaign seems to be a purely American programme, having nothing much to do with us. It has been included in such detail because I feel that we urgently need something similar—a strong citizen initiative to highlight the true nature of our energy and environment crises so that an attempt can be made towards solution. These problems are too vital to be left for the political leadership to blunder along

One individual initiative which we plan to carry out in full earnest is the Anumukti Cycle yatra from Vedchhi to Peringome in Kerala. We plan to reach Peringome in time to commemorate Chernobyl Day on 26th April. The antinuclear movement against the proposed Peringome nuclear power plant is going to hold a convention and they want groups from all over the country to come there to express solidarity. If other groups especially from the southern states could also come to Peringome in large numbers simultaneously it would be a very fine expression of people's will.

# CANDU Won't Do

CANDU nuclear reactors are inherently unsafe. Their operating record in Canada shows that they present a serious risk of a major accident. This is the conclusion of a Greenpeace review that examined the operating records of three CANDU stations in Ontario province of Canada from 1989-1991: Pickering, Bruce and Darlington. Authored by Stan Gray, study found incidents that could have triggered a meltdown scenario. It also found that the safety systems that would protect against this were impaired and unavailable a good part of the time.

The study looked at the record from the years 1989 and 1990, and the available records from 1991. These records are on file at the Toronto head office of Ontario Hydro. (The utility company which owns and operates all the nuclear reactors in Ontario.) One should note that this Greenpeace report is based on facts as reported by senior Ontario Hydro management in public documents. As a result it probably errs on the side of underestimating rather than overestimating the risks and dangers. One can reasonably assume that officials tend to underreport or downplay incidents that might put the public safety in jeopardy because they want to reassure a concerned public.

The facts outlined in the study indicate that

- 1. A major accident is possible
- 2. In the past, the CANDU reactors have sometimes come very close to such a scenario
- 3. These problems will continue into the future

## An Appaling Record of Unavailability

### Shut Down Systems

The two shut down systems used in CANDUs need to be extremely fast acting and automatic since an emergency may develop in seconds, too quickly for operators to respond in time.

Since the reactors came on service, there have been numerous emergency shut-downs—some necessary and other "spurious" or accidental ones. To Ontario Hydro management this is proof that the system works - major accidents were avoided by the shut-off mechanisms. This history is, however, double-edged in its implications. A large number of shut-downs means that there were a large number of situations calling for emergency response. The implication is that should the shut-off system not function when called for, we would indeed be in a serious trouble.

The fact is that the shut-down systems have been often impaired and unavailable. Should an emergency develop at a time when the systems are unavailable, the automatic shut-down won't kick in. At that point we might edge right into a major nuclear accident.

The Significant Event Reports (SER) filed by Ontario Hydro detail many incidents at all stations over the last two years. At Bruce B for example, it was found out that the safety systems at some units would not shut the reactor down when the fission became abnormally high ("neutron overpower"). Investigation showed that the systems would only respond to a higher than designed level and that this condition had existed for 8 months in one unit and 17 months in another.

### Emergency Cooling System

Should the core begin to overheat, the Emergency Cooling Injection system (ECI) is supposed to kick in and flood the core with cooling water. The problem here is that the system is often not triggered on time and may not work when triggered.

An examination of these ECI systems by the official Nuclear Integrity Review Committee found that the licensing safety requirements were violated on a frequent basis. In 1990, for example the ECI was unavailable 146 times in excess of the safety margin at Pickering A. Bruce A exceeded its margin by a factor of 331.6 in 1989.

### Containment

The nuclear industry has touted the CANDU containment system as the public's last line of defence against a nuclear accident. It is supposedly a fool proof system. Had the Chernobyl reactors had a containment building, we have been told, that tragedy would have been averted.

The record for 1990, prepared by the officially appointed Nuclear Integrity Review Committoe, shows both Pickering and Bruce stations grossly exceeded (by factors ranging from 43 times to 341 times) the licensing safety margins for availability of containment. All of this represents an appalling level of malfunction in the basic safety system of the reactors. Put very simply, for much of the time, the publics safety net has not been there. It is therefore, misleading for senior Ontario Hydro officials to repeatedly refer the public to the containment protection when their own reports indicate that it is defective for substantial periods of time.

The nuclear authorities have continually told a worried Canadian public that a Chernobyl-type accident couldn't happen in Canada. Their soothing reassuarances have been based upon the supposedly superior safety design of the CANDU reactors/The operating record, however, shows that the system has never functioned according to the ideal model described by industry spokespersons. The public statements have not matched the information contained in their own technical reports. Their description of the nuclear plant operations have been more fantasy than fact.

The record shows that the accident risks stem both from design faults as well as from equipment failures. The documented record of flaws, breakdowns and unavailability is staggering. (See Box page 3.)

## Loss of Electrical Power

Electrical power is the key to all the systems in the generating stations. Loss of power means loss of control. It is for this reason that CANDU stations have a number of redundant electrical systems, standby generators, and emergency power supplies that can kick in if a major failure occurs.

On September 16,1990, the main output transformer at the Darlington nuclear power station exploded, spilling 59,000 litres of oil. This was the second such main output transformer explosion at the Darlington station in two years. The explosion led to the loss of operating power to the plant (so-called "Class IV Power"). The electrical systems are built so that if the main transformer blows, operating power to the plant will be automatically switched to other sources. However, the Significant Event Report states that the connectors that would provide this supply happened to be de-energized at the time...with the consequent loss of Class IV power, an unanticipated event. The report states that Class IV power was eventually restored, with no unit shutdown indicated. However, this was an accident that should not have happened at all! All this is more worrisome when we look at how often the various emergency power systems were unavailable. A month after the explosion, for example, a routine inspection at Darlington found that Standby Generator #1 could not be safely run. At Pickering, there are twelve reports of standby generators failing to start during the period 1989-91. There are also reports of other emergency power systems failing as well as several instances where the whole station lost its required safety margins with its electrical systems.

### "Hot Particles: Danger to Worker's Health

Workers have complained for years about excess exposure to radiation inside CANDU nuclear plants. The event reports document instances of spills, leakages and other hazards from radioactive materials. In March of 1990, workers walked off the job at Pickering to protest Ontario Hydro's inadequate monitoring of radiation exposure. They said that they had been complaining about the problem for fourteen years.

One of the biggest concern of workers has been regarding excess radiation from so-called "hot particles". These consists of tiny specs of spent uranium fuel or cobalt-60 particles which have escaped from holes in the fuel cladding, or from fuel debris released from damaged fuel bundles.

Ontario Hydro has acknowledged and documented the problem several years ago at the Bruce plant. The source of these leakages is the fuelling machine that loads the uranium bundles into the core. This is significant, because "on-line" fuelling machines are an unique feature of the CANDU reactor. According to a management memo *"Hot particles are found in the heat transport system and the primary method of these particles escaping out of the heat transport system is through the fuelling machine."*

## Pickering-2
## September 26,1990

*"... the potential for flux oscillations is a fundamental, albeit undesirable, characteristic of CALNDU reactors, which must be addressed both in the design phase and during operation." Ontario Hydro Report Feb. 1991)*

On September 26, 1990, unit 2 at Pickering experienced a severe runaway fission reaction. Parts of the reactor core began to act independently and went out of control, fissioning at a rate beyond acceptable limits. The patterns were erratic and unexpected. The operators were u liable to bring the fission under control for about 50 hours. During this time more than 11,000 alarm messages were received. (This is referred to as a 'severe flux tilt' or 'flux oscillation'. The term 'flux' is an indication of the density of free neutrons in the core.)

A number of alarming things happened during this major loss of regulation accident. Fission ought to be dampened by the use of coolants in various sectors of the reactor core ("liquid zone control"). However, these proved ineffective at the time. Unable to control runaway fission for several shifts, the unit was manually shut down.

The subsequent high-level investigation revealed that this problem was endemic to CANDU reactors. The malfunction was inherent in the system's basic design: no adequate methods were available to identify or control such severe flux tilts. The reason for this flaw lies in the fact that with a large core, geographical segments of the core start acting independently of each other like a number of small cores. In some cases, segments may develop runaway fission reactions of their own. The system has no way to either avoid these runaway reactions or of controling them subsequently. Its "spatial" or "zone control" is fundamentally flawed. The Nuclear Integrity Review Committee viewed this incident as an especially serious one. It listed the main causes for the event as:

- A lack of operating procedures for the identification and handling of severe flux tilts
- Insufficient emphasis on the importance of conservative decision-making
- An incomplete transfer of experience from previous similar events
- Impaired spatial control capabilities of he reactor regulating system...

Another of the alarming things that happened during this flux tilt was the breakdown of devices used to measure the rate of nuclear fission - the flux detectors. These began to produce very high readings indicating excessive fission. However, one of the computerized control system that used them was discarded either because the station operators believed the readings were erroneous or because they had to disregard the high level alarms in order to try and bring the runaway fission under control. But once that happened, the operators lacked reliable monitors indicating the fission activity in the reactor core. The situation can be compared to driving on a highway with the windshield blacked out.

The flux-detectors are a key part of the emergency shut-down mechanisms. Yet when many of them gave critically high readings and alarmed, automatic shutdown did not occur. It is unclear exactly what happened here—was the shut down system ineffective in reading and responding to major fission overpower? Or, was the safety system somehow overridden and rendered ineffective, and if so, how? There are many possible answers to this, none of which can give the public any confidence in the safety protection of the CANDU system.

## What About the Indian CANDUs?

*The operating record of Indian CANDUs is much worse than that of the reactors in Canada. In fact the operating record of the Canadian reactors has been held up as an ideal by Indian nucleocrats.*

*On an average Rajasthan Unit-l—the "prototype"Indian CANDU—has been down 233 days a year. Of these around 150 days have been due to equipment related failure.*

*Rajasthan Unit-2,—the most productive Indian CANDU—has been down 106 days a year of which some 65 days have been due to equipment failures.*

## History of Problems

We can get a better perspective on these events and the dangers they present when we look at other incidents, The sad fact is that such runaway reactions have constantly occurred at CANDU stations and present station managers with endemic problems. In the early years, the Pickering station experienced frequent loss of regulation accidents. In fact, during its first four years the plant had six such accidents. Subsequent design modificatons have not been able to solve the problem as recent events indicate.

Even prior to the September 1900 events at Pickering-2, a similar flux tilt was experienced at Unit-1, Pickering on February 15, 1989. Although, the Atomic Energy Control Board (AECB), Canada and Ontario Hydro officials reassured the public regarding the September incident at Pickering, there have been two similar incidents subsequently on November 22nd 1990 and on January 10, 1991 at the same station.

## Gauges that don't work and regulators that don't care

The AECB is charged with the responsibility of regulating the nuclear industry in Canada. It has been frequently criticized for being too close to the industry, apologizing for it rather than regulating it.

Michael Abbot was a technologist with Reuter-Stokes in Cambridge, Ontario, the firm that manufactured the flux detectors. In 1986 he reported that the company was passing on defective? detectors, ones that had failed the tests. He said that test reports were rewritten to omit the fact of failure When Abbot reported his concerns to the company, he was told to forget about the matter. After much introspection, he wrote to AECB and Ontario Hydro, giving details of the falsified test reports No official of either of these bodies ever spoke to Abbot. They checked with the manufacturer and accepted their word at face value. Abbot was subsequently harassed by the company and forced to leave his job. It is only now, after the incidents at Pickering and elsewhere that AECB has admitted to the press the validity of Abbot's charge. And, as a consequence, Ontario Hydro recently "made a decision to replace all the flux detectors rather than wait for a rash of failures."

## Conclusions

The CANDU reactors pose unacceptable risks. Greenpeace believes they should be phased out as soon as possible. An immediate ban on future nuclear expansion should be declared and existing reactors should be taken out of service and the money saved should be used to phase in safer methods of generating electricity and to create alternative economic development.

# How USSR Squanders Its Energy Reserves

*article was written at a time when USSR was still a political entity. However, its observations and conclusions still hold true. In fact, one could replace the word USSR with India in the article and the whole thesis would still be valid!*

One of the most urgent priorities talked about in the Soviet Union is how to increase energy production. The hope is that big Western companies will rush in to drill holes and build gas pipelines, thus enabling the USSR to "exchange" its raw materials for modern technology that will help "reconstruct" the country.

True, the Soviet energy system is in a bad way. There are serious shortages in some sectors, like coal, and the country cannot do without the hard currency it derives almost entirely from its energy exports. Energy production and transmission certainly need to be modernised, but it is more urgent to overhaul the corruption system, without doubt one of the most wasteful in the world. More efficient energy use is vital in so many areas that there can be no economic recovery without it. If encouraged with unwavering political determination, however, it will have a decisive bearing on modernisation, higher living standards, increased productivity and repair of the environment.

The most striking feature of the Soviet energy system is the diversity of its production and the size of its resources: the USSR is the world's biggest producer of oil and natural gas, and the third biggest producer of coal. Its oil reserves represent 8 percent of world reserves, its gas reserves, 40 percent, and its coal reserves, almost 30 percent.

The USSR is a net energy exporter: exports are the equivalent of 19 percent of total consumption. The US imports 18 percent of its energy, and the EC, 51 percent. There is an abundance and apparent superiority, but there is also economic vulnerability.

Energy use per inhabitant varies greatly: the US figure of 7.7 TOE (Tons of Oil Equivalent) is more than twice that of EC (3.4 TOE), with the USSR in between (4.9 TOE). But this consumption pattern does not take into account differences in economic levels, as can be seen from the figures for energy intensity (energy consumption relative to the GDP): per $1,000 of GDP, the USSR uses two and a half times as much energy (0.89 TOE) as the EC (0.35 TOE) and the US one and half times as much (0.53 TOE)

Some of the discrepancy can be explained by the much harsher climates and huge distances that both the US and USSR have to contend with. But it mostly arises from their less efficient use of energy at consumer level which is due to the plethora of resources they enjoy compared with the EC, and to a production oriented ideology that has dominated, both systems.

### Soviet Relief

Five years ago many Soviet citizens thought they were donating their roubles to an "aid fund for Chernobyl victims". This year, when the Soviet government's state commission for extraordinary situations released a detailed report on its total expenses since the Chernobyl accident, they learned that the government had spent 425 million roubles to reloctate evacuees, 5.8 million roubles to purchase contaminated meat, and even 1.5 million to entertain foreign scientists. But the best was that the figures also included 66 million roubles to cover the general expenses of the ministry of nuclear energy, which, were paid from the Soviet public's contributions.

Priority has always been given to increased output at the expense of steps to improve energy efficiency. Hunger for profit and hunger for power have converged, in the short term at least, in an unbridled exploitation of natural resources.

The limitations of Europe's energy resources have forced it to be more energy efficient than the US and USSR. This gives its economy an overall competative edge, thus turning a handicap into an asset. The EC has also expanded its energy production facilities prudently. Only in France have successive governments, obsessed with notions of grandeur, overreached themselves with a massive nuclear energy programme.

The situation in the US did, however, change significantly after the first oil shock and the country's increased dependence on oil imports. Between 1974 and 1988 energy use per habitant more or less steadied as a result of greater energy efficiency. Energy intensity fell appreciable over the same period. In the USSR, despite official talk of energy-saving programmes, that intensity has risen relentlessly in the last decade.

Energy use is disastrously inefficient in every sector of activity, and nowhere more so than in urban heating, which gobbles up energy and results in colossal wastage. If you stay at a Moscow hotel in January, you have to keep the window of your room open all night because the temperature inside is 30+°C—and there is no regulation system. The route taken by the pipes of the urban heating network is betrayed by lines of melted snow on the pavements.

Because of its inability to control energy production and, above all, consumption, the USSR paradoxically faces very serious problems despite sitting on gigantic resources. The production-oriented dogma characteristic of Soviet economic history is still rife in official circles, even if it has been considerabley watered down by economic and especially ecological constraints.

The country lavishes 40 percent of its productive investment on the energy sector. At the same time, it is having to spend large sums on modernising industry and improving living standards. There is much scope for energy saving, both in existing installations requiring renovation (building insulation, heating regulation, industrial conversion and modernisation) and in new equipment, housing, transport systems, household appliances and so on

Soviet experts believe that if appropriate steps are taken they can reasonably expect to save about 2S0 million TOE over the next ton years. That may seem a lot, but it should be remembered that France, whose primary enegy consumption is now about 200 million TOE, or seven times less than that of USSR, achieved annual savings of 40 million TOE between 1071 and 1089.

Energy savings has already been the subject of important decisions by Soviet leaders. But even they admit that results have been disappointing: the USSR's energy intensity has risen steadily. Free marketeers believe that the main if not the sole, reason for that failure is extremely low energy pricing, which does not reflect production costs. Energy products are regarded as indispensable staple commodities and are therefore subsidised. So there has been no incentive at any level to save energy.

There will have to be a slow process of increased tariffs that goes hand in hand with the modernisation of the production system. The consumer can reasonably be expected to pay for the real cost of energy only when obsolete and leaking urban heating systems have been renovated. In other words, energy saving programmes should be implemented before the notion of realistic pricing is introduced.

The main problem is a centralised decision-making system that precludes any initiative or responsibility. The central planning agency decided on an energy-saving programme that specified the rate at which each ministry and enterprise was to reduce its energy consumption. Meanwhile the industrial production agency was given the task of ensuring that equipment would be manufactured that would make such targets feasible. But it was not given the proper resources to do so, since priority was still being given to energy production.

The system soon seized up: consumers found excuses for not respecting their targets, some of them justifiable, such as the fact that no energy-saving equipment was available. But the biggest obstacle was that no one saw rational energy use as a priority.

Energy saving is just one example, albeit a very important one, of the USSR's difficulty in changing the way it runs its economy. The right solution will not be found in the mirage of privatisation or realistic pricing which is overenthusiastically peddled by Westerners—and now all the rage in Eastern European countries—nor even in the more general principles of a market economy. A successful process of change will hinge above all on the decentralisation of decisions, responsibilities, resources and programme implementation.

Recent political developments suggest that this decentralisation will have to take place at the level of the various republics. As for the Russian republic, it will almost certainly pull through the crisis only if it abandons the illusion that it can organise everything from Moscow.

*Bernard Laponche*
*Le Monde*
*From Guardian Weekly*
*December 8. 1991*

***Editor's Note:***
*The dissolution of USSR and the rapid political and economic changes being put through in that region of the world has not invalidated any of the points being put forward by the author. But more interestingly, in fact, vitally for us, his arguments are of even greater validity when applied to India, since our energy wastage is greater, we are no less enamoured of the magic wand of privatisation and foreign capital and to top it we have far less resources than what were available USSR.*

# Koodankulam Gets a Reprieve

The Soviet-aided nuclear power project at Koodankulam in Tamil Nadu has been scrapped, according to a spokesperson of the Nuclear Power Corporation (NPC).

'The project stands cancelled and the NPC has already disbanded its staff assigned to the project, "hesaid. Under an agreement with India, the earstwhile USSR had offered to build a 2,000 MW nuclear power station. It had also agreed to provide a Rs 5,000 crore loan for the project. The NPC spokesperson said that there had been no communication from the present authorities in Moscow, but "we have indications that the project is off."

Except for site preparation and foundation studies, NPC had not done any major work at Koodankulam and India had not paid the Rs 100 crore to the Soviets for the preparation of the detailed project report, he said. According to the spokesperson, the Koodankulam site will not be abandoned. The NPC has sought the government's permission for setting up two 500 MW reactors of Indian design in the same place.

*Indian Express January 20,1992*

# SUN DAY 1992
# A Campaign for a Sustainable Energy Future

A growing number (already more than 300) of U.S. national and local environmental, consumer, student, government, business and other organisations are joining together to sponsor a coordinated campaign to promote improved energy efficiency and revewable energy technologies as solutions to global warming, energy imports, radioactive waste, and other local and national environmental pollution problems. This campaign is being called Sun Day 1992: A campaign for a sustainable energy future.

The campaign will include a national day (Earth Day - April 22, 1992) to focus attention, particularly of the media and government officials, on these issues. But it is not being planned as a one day, one-shot event. It is rather an attempt to encourage, launch and support on-going educational, political and other activities. It will serve as an umbrella for many diverse but uncoordinated local efforts so that their impact should bo greater than the sum of multiple individual efforts.

## Need

Global warming threatens worldwide environmental disruption; already six of the hottest years on record occured during the 1980s and 1990 was the warmest year ever recorded. Yet national policy makers remain indecisive amidst this pending global catastrophe. Other energy related problems, such as the build-up of radioactive wastes, acid rain, oil spills, and urban smog continue to worsen.

Ironically, there have been both tremendous advances in renewable energy technologies likesolar, wind, geothermal, biomass, and hydroelectric and in the efficient use of energy during the past decade, coupled with dramatic reductions in the cost of these technologies. Today, energy efficiency improvements have saved more energy and renewables are producing more energy every year than nuclear power and "clean coal" combined.

Moreover, many improved energy efficiency and renewable energy technologies could reduce CO2 emissions by at least 25% over the next two decades. These technologies are inexpensive, quick to implement, and environmentally safe options for reducing CO2 emissions. These technologies are also sensible solutions to other adverse envirnomental and economic impacts of conventional energy supplies.

Nevertheless, it now seems increasingly likely that U.S.Congress will approve either weak supportive legislation in 1992 or none at all. It may even approve legislation that actually worsens the damage to the environment, consumers and taxpayers. It is virtually certain that there will be no significant initiatives from the White House to promote these sensible solutions.

Even the national media, while reporting aggressively on the so-called "revival" of nuclear power and the development of so-called "clean-coal", have generally failed to cover the technical breakthroughs, price drops and energy contributions of improvements in energy efficiency and emerging renewable technologies.

In the absence of national leadership, there is a growing number of local and state initiatives to promote progressive energy policies. These efforts are largely uncoordinated; inadequate communication among policy makers and others has led to much duplication, as well as a sense among individual activists that they are "out there", all alone.

Moreover, there is a great reservoir of untapped energy among grassroots citizen groups, local and state government officials, rural organisations, students, religious groups, unions, businesses, and individuals who are searching for opportunities to promote an energy program based on efficiency and renewables. However, in many cases, would-be activists lack information, resource contacts and policy ideas needed to translate their potential energy into action.

Notwithstanding the advances made by renewables and efficiency during the past decade, their gains have largely constituted a "quite revolution". That is, most members of the general public as well as media and key decision makers remain unaware of their current contribution to the nation's energy supply, cost and near term potential. Despite their advantages, these safe-energy options continue to be dismissed as alternatives to nuclear power, increased oil exploration or coal based energy technologies.

## Structure and Programmes

SUN DAY 1992 will be modelled on, and borrow from, both the original SUN DAY (May 3, 1978) and the 1990 Earth Day. Earth Day (April 22,1990) was very successful in generating media attention for weeks prior to the actual day and resulted in positive changes in consumer buying habits and business perceptions of environmental issues. The original Sun Day on the other hand, was more of a launching pad for a sustained effort at the local, state and federal levels to promote renewable energy technologies. The movement it helped found remained active and effective for several years. However, both that Sun Day and Earth Day 1990 were, to large degrees, centrally planned and operated on a top-down basis. Both relied heavily on large budgets and corporate or governmental fianancing which, in some cases, may have compromised their initial objectives.

SUN DAY 1992 will include an aggressive media outreach effort

## Statement of Principles and Goals

Global climate change, oil spills, air pollution, acid rain, radioactive emissions and waste, rising oil imports, and other energy-related environmental and economic problems continue to worsen, threatening major worldwide impacts. The nation's energy strategy must, therefore, begin now to shape and manage a transition to a sustainable energy future that assures a safe, clean, affordable, adequate, and independent energy supply.

National surveys confirm that the American people overwhelmingly believe that such a strategy should be based primarily on efficient energy use and renewable energy s upplies, rather than on conventional fossil fuel and nuclear power energy sources. However, national energy policy makers have thus far failed to implement such a strategy. From this failure comes the need for a national grassroots campaign for an energy policy that embodies the following principles.

First, the United States must give priority to those energy options that maximize benefits such as environmental protection, local economic development, regional self-sufficiency, and job creation, while minimizing economic, environmental and social costs.

Second, the United States must avoid energy technologies that are particularly hazardous to human health or to the local and global environment.

Third, the United States must minimize the use of energy imports in order to avoid economic disruptions and protect national security and the economy.

Consistent with these principles, tha nation's energy policy should be based on improving energy efficiency, conservingenergy, and developing clean, renewable energy sources through local, state, and national initiatives. To facilitate the transition to a sustainable energy future, U.S. energy policy should strive to implement, at the minimum, the followinggoals, while recognizing that more aggressive targets are achievable and may ultimately prove to be necessary.

- National energy intensity (i.e. energy use per unit of Gross National Product) should be reduced by 3 percent per year, while total energy consumption should be reduced by 10 percent from today's levels by the year 2010. This can be accomplished through the implementation of existing energy-efficient technologies, energy efficient motors and appliances, high - output low-wattage lighting, and more fuel efficient vehicles and alternative modes of transportation (e.g. mass transit, bicycles), as well as through recycling and common sense energy conservation measures. (Such measures reduced projected energy demand by at least 25 percent between 1973 and 1986.)

- The environmentally responsible use of existing direct solar (e.g. photovoltaies, solar thermal, hot water and space heating), wind, hydroelectric, solar-hydrogen, biomass (e.g. wood, agricultural wastes, sewage, alcohol fuels), geot hermal, and other renewal bo energy technologies in both centralized and small-scale appplications should, in total, be tripled by the ear 2010, so that they provide 25-30 percent of the U.S.'s energy supply. (These technologies now account for 8 percent of energy consumption and 13 percent of electricity generation.)

Realizing the above goals would enable the United States to reduce emissions of carbon-di-oxide, the primary global-warming gas, by at least 20-25 percent by the year 2010. (Other industrialized nations such as Germany, Austria, New Zealand, Denmark, and Australia have already set goals of 20-25 percent reductions in $CO_2$ emissions by the year 2005.)

to help focus the attention of the general public and decision makers on the status and potential of renewable energy technologies and energy efficiency improvemnts. These will include frequent news releases, press conferences and radio and TV talk shows. However, the campaign has been designed to be more than just a one day event. Hence it will include:

- Working with participating groups to survey the energy views of and to solicit support from candidates for elective office in 1992 at all levels of government.

- Associating with local, national and international conferences on energy, environmental protection, economic development and global warming issues already planned for the months following April 22, 1992, such as the United Nations Conference on Environment and Development.

- Provide information on model programmes to public officials and others to facilitate legislative and administrative initialives that advance the SUN DAY 1992's goals.

- Prepare and distribute materials to teachers, students, the media, activists and others in addition to sponsoring ongoing educational programmes in schools and colleges as well as among environmental, labour, business and other communities

SUN DAY 1992 will have a national information clearinghouse that will collect, develop and distribute written materials. These will include:

- Listings of organisations and bibliographies of written materials
- Basic information on the cost and availability of different efficiency and renewable energy technologies
- Model legislation (good programs around the country and in other countries.)
- Ideas for ongoing local projects

On the national level, supportive tasks will be carried out by many participating organisations, to the degree of commitment they make to the programme. By relying heavily on the existing staff of participating groups and by emphasising planning at the local level, the financial costs of the programme's implementation should be kept to a minimum and the need for a large administrative staff eliminated. Furthermore, the decentralized and low-cost structure put into place for this programme is one that should be sustainable and thus able to continue to support these and other ongoing activities in the months and years following beyond SUN DAY 1992.

Though focussed primarily on the United States, efforts will be made to alert organisations in other counries to encourage them to launch parallel efforts. At the very least, there will be an ongoing exchange of information with such organisations.

Any person or organisation that wishes to be formally associated with this effort can do so simply by endorsing a short statement of goals. (See Box, previous page)

*Contatct Address*

*Ken Bossong*
*Public Citizen*
*215 Pennsylvania Avenue, S. E.*
*Washington D.C. 20003 U.S.A.*

# Global Warming
# Impacts of Competing Energy Technologies

A recent advertisement distributed by the U.S. Council for Energy Awareness, the nuclear industry's public relation arm, claims that "Every time you breathe out, you release more carbon-di-oxide than the generation of electricity from nuclear energy." This ad is a part of nuclear industry's campaign to portray nuclear power as an environmentally clean technology that produces no CO2, the primary greenhouse gas, and is therefore a logical solution to the world-wide problem of global warming. The campaign's goal is to build support for the construction of a "new generation" of nuclear reactors at public expense.

Left. unsaid by the nuclear industry is the fact that many renewable energy technologies and energy efficiency options produce either significantly less or comparable amounts of CO2 than do nuclear power plants. During the last few years there have been a number of independent studies conducted by different organisations to find out what are the impacts of competing energy producing technologies on greenhouse gases.

## U.S. Department of Energy

Dr. Robert A San Martin, Deputy Assistant Secretary for Renewable Energy at the U.S. Department of Energy (DOE) prepared the study, *Environmental Emissions from Energy Technology Systems: The Total Fuel Cycle.* When the total fuel cycle, including uranium mining, plant construction, and subsequent operations and maintainance, is examined, a boiling-water nuclear reactor actually produces 7.8 metric tons of CO2 per gigawatt-hour. While significantly less than that produced by the combustion of coal (964 t/g-h), the $CO_2$ resulting from nuclear generated electricity is equal to or greater than that produced by renewable energy technologies in most cases.

However, wood and biomass combustion coupled with the regrowth of trees actually reduces $CO_2$ concentrations by 160 t/g-h. This occurs because wood plantations create a carbon cycle over the life of a plant by absorbing CO2 from the atmosphere during crop regrowth. Emissions are further offset by the carbon storage capacity of the roots and other unharvested portions of the biomass that remain in place.

The DOE study can be obtained from Dr. San Martin's office at the U.S. Department of Energy, Washington D.C.

## Friends of the Earth

The second study was conducted by Earth Resources Research Ltd. for Friends of the Earth (U.K.) and a supportingstudy was done by Dr Nigel Mortimer, an independent energy consultant. It found that operating a 1000 megawatt nuclear power station produced 230,000 metric tons per year of CO2 while renewable energy technologies operationg at a comparable output yielded three to four times less. Hydro power resulted in 78,000 t/y, tidal power 52,000 t/y and wind power 54,000 t/y. But most spectacular were energy efficiency improvements: fiberglass loll insulation - 24,000 t/y; polystyrene cavity wall insulation - 23,000 t/y and low energy lighting-12,000 t/y.

Furthermore, the FOE study notes that expanding nuclear power capacity worldwide would increase uranium consumption. However, only limited amounts of high-grade uranium ore are available. Additional uranium resources are known to exist at lower ore grades, but as the ore grade declines, larger quantities of energy, including fossil fuels would be needed to mine and process the ore. thus increasing the amount of $CO_2$ released. As the grade of the ore declines, $CO_2$ emissions eventually equal that of fossil fuel electricity generation. Dr Mortimer concluded that the "point of futility" - where as much $CO_2$ would be released in producing nuclear power as from direct use of fossil fuels - would be reached in just 23 years in U.K. if U.K. completely switched to nuclear power. The Friends of Earth report can be obtained from

*FOE,*
*26-28 Underwood St.*
*London U.K. Nl 7JQ*

Dr Mortimer's paper The Controversial Impact of Nuclear Power on Global Warming can be obtained from him at

*cloEERU,*
*Faculty of Technology,*
*The Open University,*
*Walton Hall, Milton Keynes U.K.*

## Northwest Power Planning Council

The Northwest Power Planning Council has issued a third, related study: New Resources: Supply Curves and Environmenal Effects. This study attempts to quantify some of the environmental pollutants emitted by each electricity generating technology but only gives partial consideration to total fuel cycle impacts.

The report founded that "compared to all other resources except conservation, solar-thermal, solar photovoltaics, and wind are relatively benign" and their $CO_2$ emissions were quantified as zero. It added that the environmental consequences of hydro power are about the same relative level of servity as solar thermal resources. However, hydropower development is somewhat riskier, because of possible future fish, erosion, water use, and water quality concerns."

Finally, while stating that $CO_2$ emissions from nuclear reactors are "negligible," the report added that a typical commercial nuclear power plant does emit 8-9.5 curies of radioactive carbon-14 annually. It adds that nuclear power's "overall effect on the environment is about the same as natural gas" while cautioning that the risks of nuclear power are "dramatically different."

Copies of the report can be requested from

*851 S.W. Sixth Avenue, Suite*
*1100, Portland, OH 9720-1-1348*

## Institute for Applied Ecology

West Germany's Oeko-Institute (Institute for Applied Ecology) has released a fourth stydy confirming that wind, small hydro, and solar technologies emit less $CO_2$ when their fuel cycle is considered that both fossil energy and nuclear power sources.

The study, performed under a grant from the Ministry for Economy and Technology of the German state of Hessen in Wiesbaden, found that micro-hydro units produce 200 kilograms (kg) CO2 per 100 megawatt-hours (MWh). Based on analyses of 25-kW wind and photovoltaic systems, the researchers found that the wind energy sources produced 3,000 kg $CO_2$ per 100 MWh..

By comparison, nuclear power generated 5,400 CO2 per 100 MWh. This is an amount greater than the gas-fired cogeneretion system considered in the study which generated only 3,300 kg CO2 per 100 MWh.

For more information, contact

*Uwe Frische, Oeko-Institute,*
*Prinz-Christians Weg 7,*
*6100 Dramstadt, Germany*

## Rocky Mountain Institute

The findings of these four studies should be further considered in light of a 1988 study issued by the Rocky Mountain Institute, a private research firm based in Old Snowmass, Colorado. It concluded that investments in nuclear power actually contributes to global warming in that it precludes investments in more effective carbon dioxide abatement strategies.

The study, Greenhouse.Warming. Comparative Analysis of Two Abatement Strategies, assumes that the future cost of nuclear power drops to only 5 cents per kilowatt-hour of electricity produced while the cost of energy efficiency investments is only 0.5 cents per kilowatt-hour of electricity saved. At those costs, electricity efficiency investments would displace between 2.5 and 10 times more carbon than would similar investments made in nuclear power.

Consequently, the "environmental cost" of a six-fold expansion of nuclear power worldwide would total 17.3 million metric tons (MT) of $CO_2$ between 1995 and 2025 That is, "for every $100 invested in nuclear power as a $CO_2$ abatement strategy, one MT of $CO_2$ is released into the earth's atmosphere that could have been avoided had that $100 been put into efficiency."

The Rocky Mountain Institute can be reached at

*1739 Snowmass Creek Road. Old*
*Snownmass, CO 816549199*

## Conclusions

The bottom line for all of these studies is that nuclear power does generate $CO_2$ when its full fuel-cycle is considered and will likely generate more as higher-grades of uranium ore are depleted and if new nuclear reactors are built.

While usually producing less than many fossil fuel options, nuclear power docs generated more CO2 than an array of energy efficiency and renewable energy technologies.

The nuclear industry would do the general public a service if it presented a more complete and accurate picture of its role in global warming than its current compaign is presently doing.

Furthermore, the high cost of nuclear power may preclude investments in less expensive energy option such as efficiency and renewables that have lower $CO_2$ emission.

In as much as choice will need to be made among competing energy options when deciding how to invest limited research and development dollars, energy efficiency and renewable energy technologies appear to be the better global warming solution in which to invest.

# A Discussion of 'DEFENDUS'

When we look at the energy scenario over the next seventy-five to hundred years, it becomes clear that there are going to be major upheavals. The mainstay of today's energy - oil and gas are likely to be in extremely short supply. Coal and nuclear are already facing opposition because of their adverse environmental effects. Thus, the question arises, as to what would be the future sources of supply?

A paper entitled "Development Focussed Enduse Oriented Scenario (DEFENDUS), published by Dr A.K.N.Reddy and others was published in two parts in *Economic and Political Weekly* in its April 6 and April 13, 1991 issues. This paper not only identifies the reasons for the failure of the current electricity planning to deliver the goods, but also presents an alternative approach which emphasizes equity and sustainablity.

A two day discussion was held in Baroda on October 5th and 6th, 1991 to discuss in detail the DEFENDUS approach. The participants at the discussion ranged from energy specialists, power engineers, rural development workers, environmental activists... In other words a typical I.I.T. crowd. The discussion ranged over the whole gamut of issues raised by the new DEFENDUS approach—the general theory as well as difficulties associated with the introduction of some specific new technology. Out here we shall briefly present some of the points raised by the participants.

## DEFENDUS Approach

The Development Focussed End Use Oriented Scenario is based on a three pronged approach which encompasses both the demand and supply sides. These are:

- Assigning specific growth rates (as against an extrapolation of past trends) for various categories of consumers. These rates are determined by social goals like satisfying the basic needs of all and creation of maximum employment

- Maximising the use of demand side management techniques like increasingenduse efficiencies, load management and the appropriate substitution of electricity with other forms of energy.

- Use of decentralised and renewable energy sources to augment electricity supply

## The Discussion

All the participants agreed that setting up specific growth rates for specific sectors is a valid methodology of managing the demand. In fact, this is precisely what is done by the conventional planning by assuming the continuation of past growth rates for future. This too, is a choice in itself, though it may not seem as such.

It is important to understand that the elecricity planning should address itself to not only supplying the projected demand, but should concern itself with the shaping the magnitude and the pattern of that demand in the context of social goals.

It is in this context that the search for alternatives assumes great significance. For example, the most needed evolution of low cost housing ideas based on composites and local materials would dramatically reduce the importance of cement industry. A shift towards organic farming has the potential to render a large section of the fertilizer industry redundant, thus reducing oil as well as power consumption. Similarly, use of sound water-shed management techniques can dramatically change the availability of surface and ground water and can bring down the consumption of irrigation pump sets to a very low level.

It needs to be emphasised that these kinds of efforts to evolve alternatieves are eminently desirable in their own right. The failure on part of the establishment to encourage and support such initiatives is driving us towards a more inequitable and energy intensive society. These errors need to be urgently rectified.

Unfortunately, a large part of the Indian electricity establishment has still not grasped the significance of the fact that improvements in enduse efficiency and load management offer the cheapest, fastest and the most environmentally benign option for managing increasing demand. While some agencies are making genuine efforts, these measures are considered at best as an appendix to the power planning excercise.

Many studies have shown that the potential for efficiency improvements is vast in the country. For example, Gujarat Energy Development Agency claims that 16% of the projected demand of Gujarat up to 2000 AD could be met by efficiency improvements alone. This comes to some 1,600 MW: far more than the capacity of the yet to be started Kakrapar Atomic Power Plant (470 MW). More attractively, the payback period of most of these schemes ranges from a few months to three years.

There are a number of specific efficiency improvement measures discussed in the DEFENDUS paper, like for instance, improvemerits in irrigation pump sets and introduction of compact fluroscent lighting. The participants in Baroda tried to pinpoint the difficulties and the problems which are a roadblock to the large-scale adoption of these eminently sensible measures. Thus, for example, it was felt that compact fluroscent bulbs which require a high initial investment are vulnerable to the erratic power supply obtaining in most of our cities and therefore require extensive field trials before they would become acceptable. On the other hand, efficiency improvements in irrigation pump sets has already proven itself in extensive field trials and needs to be vigourously implemented by the State Electricity Boards (SEB). Even if the SEBs were to bear the full cost of the necessary modifications, it still remains the least-cost and most attractive investment for the SEBs in terms of the capacity releaved for other uses. However, most people within the electricity establishment look at this only as some kind of subsidy to farmers. It is this kind of attitude, which is the major hurdle in the large scale implementation of these schemes.

The participants in the Baroda discussion also considered problems encountered with a lot of decentralised and renewublesources of energy. We shall be presenting their views on these in a future article in *Anumukti*.

*Shripad Dharmadhikari*
*Narmada Bachao Andalan*
*58, M.G.Rd. Badwani M.P.*
*Girish Sant*
*Amrita Clinic, Athawale Corner*
*Karve Rd.Pune 411004*

# Environmentalism Becomes a Dirty Word in Czechoslovakia

My country is a notable example of unecological development. We breathe almost unbreathable air, some of our rivers are almost lifeless and food is contaminated. The agricultural landscape, which used to be the embodiment of fertility as well as beauty, has changed into a monotonous, neglected, large-scale production area. The woods, once famous among foresters, have either vanished or are in a catastrophic condition. The generic diversity of plants and animals has been decimated.

The devastation of the environment is linked to the devastation of values that Czechoslovakia has been exposed to for the last forty years. Citizens enclosed themselves within their families, whithin the four walls of their flats, or their weekend houses. Few were strong enough to resist. The idea of morality became secondary and the satisfaction of material needs became the official ideology. The ideas of progress and historical optimism became compulsory. It is symptomatic that the word link 'ecology crisis' was inadmissible even in specialized texts. The utilitarian view of nature and profound nnthropocentrism prevailed.

Yet, even in this dismal terrain of values, there remained an undercurrent of the opposite orientation which enabled non- material values, values of altruism, concern for fellow creatures and for nature, a super-generational and global way of thinking to survive. Some people turned towards religious faith and others became interested in the protection and preservation of nature. In the period of frustrated civil interests and blocked professional careers, nature became a refuge.

A more active form of interest in nature and landscape appeared in the course of the seventies. Nature conservation associations, which used to have a relatively long tradition in this country before they were disbanded after the Communist take-over, were revived. During the second half of eighties environmental movements became vents for letting out the tensions of opposition against the fading regime.

Our conservationists cleaned up fountains and brooks, rescued individual plants, kept records of ant-hills, protected amphibian migration on roads. If they could not prevent the construction of a dam. they at least transplanted bulbs of snow-flake from the future lake bottom to safer localities. The administration on the other hand was capable of transforming whole regions into wasteland with the stroke of the pen.

While the green and alternative movemnts in Western Europe were generated mainly from the radical Left orientation, it was quite the opposite in Czechoslovakia. Our environmentalists regarded the capitalist system and market economy with hope. In fact, they did not understand the standpoint of their Western colleagues. Ecological damage was perceived as a simple consequence of the centrally planned socialist system.

The political transformation of November 1980 seemed to bo the guarantee of a miraculous turning point in the ecological situation of this suffering country. References to the catastrophic ecolgical situation were among the main arguments in the speeches from the platforms in the squares during those and also in president Vaclav Havel's first New Year speech. The new government used to go to their first sessions together by bus! A number of new environmental initiatives appeared in the first post-revolutionary weeks. The Czech Green Party, awaited by the public for so long, was founded at that time. Opinion polls in January 1990 established that 83% of the population considered environmental problems to be the most important of our society.

Soon it became evident that the matter was not as simple as that. The new government as well as the mass media supported the idea of intense economic growth. The neo-liberal economists gained the upper hand. Environmental concerns have been put aside. The influential finance minister, Vaclav Klaus is of the opinion that, "We must earn enough to finance ecology", and "economy is like a cake and ecology only whipped cream on the top of it."

Conservationists are coming to be regarded as a reactionary force, hindering the rapid inclusion of Czechoslovakia among the advanced European countries. The essential attraction of green movement has disappeared. Some of the competent and politically conscious people who were active in the environmental opposition group have vanished. Some of them are in the government. They probably still sympathize with our movement, but it is not enough.

We can sadly sum up: the environmentalists' post-revolutionary hopes of changes in human values are dying and this country has been swallowed up by the desire to catch up with the West as quickly as possible. One of our 'unprofitable' environmentalist journals has ceased publication, while pornographic magazines sell well.

The small number of people who are still engaged in environmental activities have decided to reject high material consumption as the goal of our society. They are attempting to live a life of intentional poverty and alternative values.

Because our government wants society to be regulated by the principles of free market, and wants to exclude all interventions of non-economic character, including ecological interventions, our environmentalists have reached the same position as the majority of green movements the world Over: the position of criticizing an economy oriented towards the stimulation of material consumption. I think that only now have we fully grasped the concerns of our freinds in the Western environmental movements.

*Hana Librova*
*Resurgence, Nov/Dec 1991*

## Letter Box

The Citizens Awareness Network (CAN) is a non-profit grassroots organization based on Shelburne Falls, Massachusetts. Most of our members live in small cities and towns located within the ten mile radius of the Yankee Rowe Nuclear Power Station, and within twenty miles of Vermont Yankee nuuclear reactor. Yankee Rowe, as you may or may not know, is the oldest operating commercial atomic reactor in the United States. (Yankee began operating in 1961.) Although at this time it is shut down, (Nuclear Regulatory Commission recommended a shut down due to "safety reasons" on October 1, 1991) Yankee Atomic has begun to spend millions of dollars to "improve" its operations and will seek to restart this summer. CAN, of course, will do what is necessary to prevent this aged and embrittled reactor from operating.

In the meantime CAN members have been researching the effects of longterm exposure to low-level radiation. One of the things that we have come across in our discussions with friends and neighbours is that there appears to be significant incidences of Down's Syndrome. (In the tiny, rural town of Buckland, for example, there are six Down's Syndrome children that I know of. All live within two miles of each other and four live within a quarter of a mile of each other. Buckland's population is around 1,000. Other health problems that CAN feels are significantly high for this area, and may be attributed to Yankee Atomic, include infertility, menstrual problems abnormalities, leukaemia, breast cancer, brain tumours and immune deficiency diseases.

CAN has brought our concerns to the Massachusetts Department of Public Health and with the help and support of U.S. Senators Kennedy and Kerry a preliminary health study may soon be underway.

We have also been concerned about tritium pollution in the Deerfield river. Yankee Rowe has been dumping liquid radioactive waste into this river for thirty-one years. The largest population areas are directly downstream and many people swim and fish in the river. There is also a possibility that many drinking water wells draw from the Deerfield River.

Kemp Houck at *Atoms and Waste* in Washington D.C. let me know about the survey work that you did in the villages surrounding the Rawatbhata nuclear power plant. I am most interested in receiving information about how you went about performing the survey as well as in receiving a copy of the survey results. As the size of the Rawatbhata plant and Yankee Rowe are similar (Yankee is 185 MW), I feel the results of your survey will be useful to the Citizens Awareness Network as a means of helping us along with our research and also in putting pressure on the Department of Public Health to take our concerns seriously.

*Gail Steinbring*
*Citizens Awareness Network*
*P.O.BOX 83*
*Shelburne Falls, MA 01370*
*U.S.A.*

We want to take this opportunity to let you know we think your newspaper is wonderful and often wish we had the funds to make copies and send it to all our readers. Keep up the good work, and success in your struggle.

*Ayn Lowry*
*Editor, WISE News Communique*

On 22nd of November, 1991 a nuclear emergency preparedness drill was held in four villages near Rawatbhata. There was strong opposition from the local people to the whole exercise and the people of Jharjhani stopped all traffic (Rasta Roko). At a meeting that evening all expressed their opposition to the activities of the nuclear authorities. On 28th November, 1991, Ms Margaret Alva gave a statement in the Parliament that the diseases being seen in the Rawatbhata region are not due to radiation but are the result of malnutrition, water pollution and the lack of medical facilities. This statement has been given on the basis of the investigation carried out by the medical team from Udaipur Medical College and also claims that similar illnesses are not being seen in the workers of the nuclear power plant. The nuclear authorities seem to be now adopting an aggressive stance. When will the results of the Rawatbhata health survey be published?

*Rotanlol Gupta*
*Rawatbhata 323305*

I saw an abstract of your epidemiological study around the Rawatbhata nuclear power plant in WISE news Communique No.361. You announced that the full report, after finishing the analysis, will be published. Could you please send me a copy as soon as it is available.

I have full understanding of your plight to do this research on a shoestring budget against the opposition from official organisations. I like to commend you and your collaborators for your selfless efforts. If it were not for courageous individuals everywhere who can not be bought off, the truth about the costs in human lives, bourne by those without a political voice, of "technological progress" would never be known.

*Dr Rudi H Nussbaum*
*Professor Emeritus of Physics*
*Portland State University*
*2393 SW Park Place # 301*
*Portland, OR 97205 USA*

# Cleanup Costs Rise Sky High

For years, the U.S. Energy Deparment has been telling Congress that it would cost about $3 billion to close and decontaminate its three obsolete uranium enrichment plants, and for years skeptics in Congress have suspected that the real figures would be much higher. It appears the skeptics may be right.

According to a report by engineering consultants that was delivered to the Energy Department in August but never made public, the cost is likely to be $20 billion. An earlier draft in July, had put the cost at $37.7 billion.

The Energy Department has recognized that cleaning up radioactive nuclear waste and decontaminating nuclear facilities is very expensive, but was apparently shocked by the consultants projection. The estimate for just three uranium enrichment plants is nearly equal to the department's projected cleanup costs at all its nuclear weapons and uranium enrichment plants.

The department said in a statement that it would not "blindly rely on its contractor's estimates without challenging them and reviewing them to assure that they are well developed and worthy of presentation to the Congress."

The so-called "D and D" costs— "decontamination and decommissioning"— are a political hot potatoe because Congress must decide who will pay the bill when it comes due, probably within this decade: the taxpayers, the nation's nuclear utilities or the utilities' customers.

In public hearings last spring, the Energy Department stuck to its three billion cost projection. But under pressure from members of Conress, the department hired Ebasco Services Inc. of New York, a nuclear and environmental engineering subsidy of the Ebasco Corp. to assess the cleanup issue.

On July 15, Ebasco submitted detailed, site by site estimates. A total of $37.7 billion or $45.6 billion, depending on whether some building were to be abandoned or refurbished for new uses. "What's happened in this estimate is these guys figured sky is the limit," one source said. "It's way to high." But the House Interior Committee Chairman, George Miller, charged that the "gross discrepancy between Department of Energy's previous estimates of these cleanup costs and the estimates contained in the new draft report raises the possibility that the department has been deliberately misleading the Congress on this issue.

*Guardian Weekly,*
*November 3,1991*

## Largest U.S. Nuclear Accident Since Three Mile Island

A major leak of tritium from the Savannah River Nuclear Weapon's Plant has contaminated the Savannah River and threatens the drinking water supplies of tens of thousands of South Carolinans. The leak, which let loose some 7,500 curies of radioactive tritium may have been the largest U.S. nuclear accident since Three Mile Island.

Contamination levels in the river were reported as high as 270,000 picocuries/litre—more than 13 times greater than the lax government guidelines permit. Water officials in the southern parts of the state were forced to shut off intake valves to the river, and had to rely on reserves for more than a week.

Public reaction to the accident was immediate, with even conservative South Carolina water officials calling for the shutdown of the plant. Public concern was probably heightened by the poor performance of Westinghouse, the plant's operator, in acknowledging the incident. Westinghouse in fact, seemed unsure as to when the accident actually happened; officials said only that it occurred between December 22 and 25.

The accident has, at least temporarily, shelved the Department of Energy's plans to restart its tritium producing K reactor in the Savannah River weapon production complex.

However, this is not the first instance of pollution by the weapon's plant. In a report released in November, 1991 the US Department of Energy (DOE) acknowledged, that it has routinely released substantial amounts (an average of 50,000 curies every year) of tritium into the air and water aroud the Savannah River Plant (SRP).

A South Carolina newspaper, *The Island Packet* recently reported that radiation has seeped into many streams near SRP and into the Savannah River in addition to the acquifers in the region. Across the river from SRP in Georgia, people have been complaining for years, about tritium in their groundwater and milk. In October, 1991, Georgia's Governer Zell Miller demanded a federal study regarding the contamination.

The releases have been occurring since 1950s. According to DOE, environmental releases of tritium were the result of a "widely held belief among weapon industry workers that tritium was less dangerous than plutonium, and other radioactive substances and thus required less careful control. Department officials themselves said DOE was more concerned about the financial implications of tritium loss rather than its environmental impacts. Tritium is used to enhance the fusion explosion of nuclear bombs. DOE's priorities are transparently obvious.

*The Nuclear Monitor*
*Vol 7 No. 9, January 13,1992*
*WISE News Communique 364*
*December 19,1991*

## People's Initiative at Trisbane

Trisbane is a small village, population around a thosand, on the river Albe, some 30 km from Hamberg. It has the misfortune of being a neighbour of one of Germany's oldest power and research reactor sites

In the past, there was not a single case of leukaemia in the village, but during the last two years there have been a sudden spate of cases—seven children are suffering from the dreaded disease.

This leukaemia epidemic has caused consternation amongst the areas inhabitants. A burger (people's) initiative has been formed and they have forced the government to take notice. The government has appointed a high level committee of epidemeologists, radition scientists and radiobiologists to study the causes.

One of the members of this team of scientists, Dr Inge Schmitz-Fauerehake, told *Anumukti* that she has found a large number of dicentric chromosomal aberrations in the siblings of leukaemia sufferers and she is doing biological dosimetry in adults.

## Subscription Rates:

Rs. 25/- per year South Asia
U.S.$15/- per year or equivalent in other convertible currencies (airmail overseas)
(Rs.300/- per year if paid for in India)
Rs.250/- for life (only within India)
Please add Rs.6/- for cheques
Drafts should be drawn on State Bank of India, Valod (0531)

### Editor: Surendra Gadekar

Subscriptions, donations, manuscripts, inquiries regarding circulation, etc. should all be addressed to:

Anumukti
Sampoorna Kranti Vidyalaya
Vedchhi, Dist:Surat, 394641 INDIA

Please do not send cheques or drafts addressed to Surendra Gadekar

Published by S.Gadekar for Sampoorna Kranti Vidyalaya and printed at The Parijat Printry. Ahemedabad

**PRINTED MATTER** **BOOKPOST**

ANUMUKTI

A Journal Devoted To Non-Nuclear India

Volume 5 Number 4 February/March 1992

# Double Envelopment

*The truth, the whole truth and nothing but the truth..*

Recently I received a book entitled "Population Exposure to Ionising Radiation in India" produced by the Kalpakkam chapter of the Indian Society for Radiation Physics. The membership of this society consists of professionals from national laboratories, universities and institutions of higher education, industry etc. The society feels that, "In the case of ionising radiations, while its hazard aspects seem to have been overplayed for historical or other reasons, its full potential in the service of mankind does not seem to have drawn the deserved attention of the general public". Dr.D.V.Gopinath, the Director of the Health, Safety and Environment Group at the Bhabha Atomic Research Centre writing the forward to the monograph, enlarges the same theme. "The scientists and technologists who have been working in these areas firmly believe that nuclear energy and ionising radiations can be gainfully harnessed with least harm to the safety of the people or sanctity of the environment. On the other hand, there is also a growing fear in the minds of the public about the harmful effects of ionising radiation. The fear could be due to incomplete knowledge and may not have any scientific basis. In any case, if the utilisation of atomic energy is to gain public acceptance, it is essential that all information about the subject is made amply available to the common men, in a language he understands. It is necessary that we generate literature which, while retaining the scientific objectivity, is intelligible to the general public"

Apart from the sexist language used, nobody can take any exception to the sentiments expressed by Dr.Gopinath. But after reading such an introduction the least one expects is a book which would try to dispel incomplete knowledge, and in fact be a model of scientific objectivity. So, what does one find?

One finds that nucleocratic scientific objectivity consists of nothing but the same old concoction of disinformation and half-truths. To give just one specific example: in a table entitled "Population Dose from Indian Nuclear Power Plant due to Gaseous Effluent Releases" they claim that the amount of tritium released from Rawatbhata plant is 900 TBq a year. However, a paper entitled "Environmental Impact of PHWR Type Power Stations—Indian Experience" by another group of BARC scientists states that the tritium release to air from Rawatbhata during 1990 was not 900 TBq but 2562 TBq. What the authors of the first study have done, in their eagerness to project a rosy picture to the public, is that they have averaged out the effluent releases over the entire lifetime of the plant. A new plant emits far less effluents. Rawatbhata used to release just 25 TBq/year- a hundred times less than at present- when it started in 1973.) Averaging is thus a neat trick to make the plant look far less dirty than it actually is at present. One wonders whether the concern for scientific objectivity is in fact a concern for truth? "Scientific objectivity" is one prong of the nuclear counter-attack. The other prong is as old as the oldest profession—bribery of influential people and opinion makers. Being scientifically objective I suppose one ought to call it "public relations". Showers of nuclear bounty have been more plentiful than monsoon showers in Kakrapar during the last year. The Mandvi school has received Rs.5 lakhs and a promise of Rs.4 lakhs more. School teachers have suddenly found themselves inundated with offers of material help in the form of prjectors and other audio-visual equipment from the plant authorities. Even anti-nuclear sympathisers have started receiving invitations to tea...

Double envelopment is a military concept pioneerd by Hannibal at the battle of Cannae. Indian nucleocrats are not Hannibal. They better stick to their double containments. One can only remind them of our national motto: Satyameva Jayate.

## Heavy Water Smugglers

Norwegian Daily *"Aftenposten"* disclosed on February 4,1992 that Roumania acted as an illegal broker to a purchase by India of Norwegian heavy water. (See *Anukukti* Vol 2 No.2, 3, October/December 1988). Heavy water is a vital component of the Indian nuclear programme.

According to *Aftenposten*, Norway sold 12.5 tonnes of heavy water to Roumania in l986. The heavy water shipment was immediately diverted and sold at a far higher price to India which was on the hunt for heavy water. Had the Norwegian authorities examined the matter properly they would have discovered that the Roumanian reactors were not then ready for test runs, leave alone production. *Aftenposten* claims that the heavy water was delivered to an Indian firm situated at Palton Road in Bombay, which is a participant of the Indian nuclear programme, according to official Indian sources.

## From the Editor's Cycle

The creek that separates Nargol from Umbergaon is a breathtakingly beautiful sight. There is the grey water, the dark sand with large seashells of various hues; the cocconut trees rising luxuriantly in the distance, the hills forming a backdrop. But most impressive of all are the boats, festooned with multicoloured flags stacked closely together. The scene was drenched in bright sunlight reminding one of that painting by Vincent van Gogh. Unfortunately, unlike in the painting there was no drawbridge nearby. To go to the other side by road is a roundabout of 25 km.

We (the cycle yatris) had decided to cross the creek by boat and were proceeding towards the embarkation point. I was, as usual, somewhere near the rear when I suddenly saw a person running wildly towards us, shouting and waving his arms. The boat was about to leave so I waved the others to go ahead and I stoppped to talk. By the time he reached me he was a bit breathless and anyway his Gujarati accent was unfamiliar to my ears. "Where are you going?" To Kerala," I replied. "We have come from Kakrapar in Surat district and there is a nuclear power plant being built in our vicinity. And we are going on cycles so that we can meet people and talk to them about our problems and listen to them." "Come and have tea with us," he said pointing to a small row of hutments in the distance.. We let the ferry go and walked over to his home. They were migrant labourers from Kathiwar who had come three months ago to this area. The tea they gave us revived us wonderfully, and we decided to sing. None of us sings very well and together we can cause quite a cacophony, but that day we sang from our hearts. Take Gandhi's way. This is the last chance." The very next day, a family thought us to be a gang of dacoits responsible for a spate of dacoities in the area, and were affraid to even talk with us. It takes all kinds.

The response to our appeal in the last issue of Anumukti regarding the yatra has been truly overwhelming. So many groups and people have given us help in such large measure through their time and money and organizational skills that one feels humble. At the same time one feels a resolve that we better be strong enough to be worthy of so much love and trust. All of us felt especially gratified and strengthened by the love and enthusiasm of the people living near the Kakrapar Atomic Power Project, who gave us a grand send-off the day before we started out on the yatra. Five young friends from the area have joined in the march. The people of Kakrapar contributod to our morale in a big way by resolving not to allow any plant official to enter their villages for conducting any kind of survey.
It is always difficult to organise and properly coordinate an effort which needs the cooperation of many different individuals to succeed. There have been many mistakes and slips on our part. However, the response till now and the many different expressions of support are a very happy augery for the success of the yatra. In fact, J have become so bold that I have decided to attempt this issue of Anumukti on the run. The 'dust' has, perhaps, reflected in the colour of this issue, which owes far more to Manoj and Peter than to me. Without their help the idea would have been stillborn..

### An outline of the programme:

*Commencement from Vedchhi: March 22, 1992*
*Entering Maharashtra; March 25,1992*
*Entering Goa: April 11, 1992*
*Entering Karnataka: April 15,1992*
*Entering Kerala: April 24, 1992*
*Conclusion in Peringome April 26 1992*

# Genetic Effects of Radiation

Since 1985, elevated rates of childhood leukaemaia have been reported around a number of British nuclear installations, in particular Sell afield, Dounreay, Aldermaston, Burghfield and other pre 1955 built nuclear power stations. However, simple geographical associations don't prove a causal link with these plants. Both the nuclear industry and its regulators have consistently argued that the doses received by the victims would have been too small to account for the observed incidence of leukaemia. Consequently, even though considerable scientific uncertainty was attached to these exposure estimates, the industry argued that it was not responsible for the leukaemias.

This argument was, however, severely weakended in February 1990 with the publication of the Gardner study, which reported an association between paternal pre-conception radiation exposure and children's leukaemia risk(1)
What is particularly important about Gardner's study is that a genetic mechanism is implied for the expression of the risk—that is, the father's radiation exposure leads to some form of the damage, or change, in the genetic material transmitted to his children.

This was reported as a completely new and unexpected finding. An excess of childhood cancer amongst the offspring of the Japanese atomic bomb survivors has not been seen.(2) In fact, no significant excess of any type of genetic damage has been seen in this population, or in any of the other populations used to provide information on the risks of radiation exposure. The vast majority of our information on the genetic risks is derived from animal studies.

The lack of information is reflected in radiation safety standards which do not take account of the probablity of genetic damage occuring in offspring of those exposed. Radiation dose limits are based upon the risk of developing a fatal cancer in the exposed individuals and not in their children. Before the publication of Gardner most authorities considered that genetic risks had been adequately assessed and if anything overestimated. This has not changed with the new ICRP recommendations, despite Gardner's findings. The ICRP, the nuclear industry and its regulatory authorities still consider that genetic risks are small compared to the fatal cancer risks faced by radiation workers or members of the public.

The lack of confirmation for Gardners findings in the atomic bomb survivors led many commentators to suggest that Gardner, therefore, must be wrong. For instance, one geneticist working with the US Government's Oak Ridge National Laboratory has been quoted as commenting: "It is completely impossible to conlude that the increases in childhood leukaemia resulted from radiation exposure of the fathers."(3)

Another scientist from the Radiation Effects Research Foundation, the joint US-Japanese funded institute studying the atomic bomb survivors, comments: "the estimated paternal doses to the Sellafield workers are too low to the result in the end point being discussed, ie. childhood leukaemia."

## Support for Gardner Study

Two other human studies have also suggested a link between paternal pre-conception exposure and childhood leukaemia. The first, published in 1966, was mainly concerned with maternal exposure. However it also pointed to an association between pre-conception diagnostic paternal and childhood leukaemia that was of "borderline significance".(4) The second was a case-controlled study in Shanghai publlished in 1988.(5)

Other scientists have argued that if genetic damage is occuring then an increase in congenital malformations would be more likely than an increase in childhood leukaemia(3)  However, some experimental work on mice suggests that both type diseas may be induced in offspring. This work, by Nomura, was cited by Gardner as support for his observations. Nomura suggested that paternal exposure induces heritable tumours in first and second generation progeny as well as genetic anomalies. These tumours were mainly of the lung, although lumpocytic leukaemias were also found.(6)

Obviously, Gardner's work has yet to be confirmed at oilier installations with excesses of childhood cancer. Nevertheless, Nomura's experiments pose a further question. Does occupational or environmental exposure to ionising radiation lead to an increase in rates of genetic diasease, and if so is this also associated with childhood cancer? The nuclear industry, no doubt, would argue that this would not be the case.

The suggestion, however, is not that unreasonable. Some work conducted in the 1960s by American epidemiologists, suggests that clusters of childhood cancers and congenital malformations may occur together.(7) It is also known that some people with particular congenital malformations, such as children with Downs' Syndrome, are at an increased risks of developing leukaemia. Thirdly, similar biological mechanisms, related to somatic and germinal mutations, may be involved in the etiology of both categories of diseases.

Consiquently, as well as of looking for further associations between radiation exposure and childhood leukaemia, it might be profitable to look for evidence of an increased risk of congenital malformations amongst offspring of radiation workers, or amongst populations living around nuclear installations.

Astonishingly, hardly any work has been done in this area! This might seem incredible seeing as a link between ionising radiation and genetic damage was first demonstrated in 1927, but it is true.

In 1955 a study was published that compared the rates of genetic diseases amongst 3,751 US Radiologists and a similar population of medical specialists who were not exposed to radiation. The information was obtained by questionniare, with a 74% response rate for the radiologists and 54% for the non-exposed control group. The majority of respondents were male. The study found a consistent trend of higher rates of abnormality in the exposed group. The study, which made no attempt to assess the doses received by the radiologists, concluded: "The differences are not of large magnitude and in themselves would not be viewed with alarm. These abnormalities occur, however, in the first generation of offspring and visible first generation effects represents only small fraction of the total damage that may have been inflicted."(8)

Surprisingly, similar large scale studies of congenital malformation rates amongst other populations of radiologists have not been conducted. In the UK, the Office of Population Census and Surveys collects data on rates of malformations, and regularly publishes reviews of regional trends. In 1985 it also published a survey of rates between different occupations for the years 1980-82. For females radiologists the data was strongly suggestive of an increased incidence for a number of classes of malformations (cleft lip and cleft palate; tracheo-oesophageal fistula, oesophageal atresia and stenosis; and Downs' Syndrome).

The result for one particular class, rectal and anal atresia and stenosis, were statistically significant. This report did not provide a breakdown into classes for male radiologists, but for all malformations together the result also suggested increased incidence.(9)

## Anecdotal data

Obviously, data such as this is only anecdotal and should be interpreted with caution, particularly in view of the small time-scale and small number of cases involved. However, this data along with the US radiologists study, does indicate a medical trend which should be investigated. For instance, in the UK there are around 10,000 members of the college of Radiographers, yet no one has ever conducted a study into the rates of congenital malformations amongst their offspring.

A number of other studies have looked at the relationship between Downs' Syndrome and radiation exposure. Most of these are concerned with the effects of medical diagnostic X-irradiation, mainly on women. Again, these studies point towards a correlation, although some of the evidence is contradictory.(10)

Only two studies have ever been conducted of congenital malformation rates amongst nuclear workers and in the surrounding communities. Both of these were published in 1988 and are by the same author, Lowell Sever. They were concerned with the Hanford Site in Washington State, which was built in 1943-44 to produce plutomium for the US atomic weapons programme. Server founded a statistically significant excess of one type malformations (neural tube defects) amongst local communities. Increased rates were also seen for other malformations including anercephaly and spina bifida.(11) The second study showed a statistically significant association between occupational exposure of fathers and neural tube defects in their children. For all malformations considered together, the study suggested a correlation that approached statistical significance.(12) When these studies were published the author conluded that they represented false positives, ie. a casual relationship was unlikely, as similar findings had not been reported in other populations, particularly the atomic bomb surviors.

Following Gardner's report it seems that Server may be reconsidering this conclusion. In February this year he wrote that "more attention needs to be paid to the potential effects of paternal exposure to low-level ionising radiation on reproduction and child health."(3)

He is currently conducting a case-controlled study of childhood leukaemia around Hanford in an attempt to replicate Gardner's association. Gardner, in turn, is conducting a study of congenital malformation rates around Sellafield.

At present genetic risk estimates used by ICRP and UNSCEAR take no account of either heritable tumours or congenital malformations. If Gardner and Server are able to replicate each others findings this will provide powerful evidence that genetic risks,like cancer risks, have been consistently underestimated.

## References:

1 Gardner et al (1990) Results of a case controlled study of leukaemia and lymphoma among young people near Sellafield nuclear plant in West Cumbria; British Medical Journal 300 432-428.

2. Yoshimoto Y et al (1990) Frequency of malignant tumors during the first two decade of life in the offspring (Fl) of atomic bomb survivors Hiroshima: Radiation Effects Research Foundation RERF Technical Report TR 4-90.

3. Server L E (1991) Low Level ionising radiation paternal exposure and children's health; Health and Environment Digest 5 No 11-3.

4. Graham S et al (1966) Preconception, intrauterine and postnatal irradiation as related to leukaemia; National Cancer Institute Monographs 19 347-371.

5. Shu X O et al (1988) A population-based case-control study of childhood leukaemia in Shanghai; Cancer 62 635-644.

6. Nomura T (1982) Parental exposure to x-rays and chemical induces heritable tumours and anomalies in mice; Nature 296 575-577.

7. Health C.W. et al (1964) Case clusters in the occurrence of leukaemia and congenital malformations; The Lancet, July 1964 136-137.

8. Macht S H and Lawrence P S (1955) National Survay of congenital malformations resulting from exposure to roentgen radiation; American Journal of Roentgenology 73 442-466.

9. McDowell M E (1985) Occupational reproductive epidemiology the use of routinely collected statistics in England and Wales 1980-82; Studies on Medical and Populations Subjects No 50, London; HNSO.

10. Rose K S B (1988) Epidemiological surveys on the effects of low-level radiation dose: a comparative assessment: Pre-conception irradiation effects; United Kingdom Atomic Energy Authority AERE R 12045 Volume A.

11. Sever L E et al (1988) The prevalence at Birth of congenital malformations in communities near the Hanford site; American Journal of Epidemiology 127 243-254.

12. Sever L E (1988) A case controlled study of congenital malformations and occupational exposure to loe-level radiation; American Journal of Epidemiology 127 226-242.

# Earth Summit and the Global Death Machine

In June this year 120 heads of States and some 15,000 representatives of environmental NGOs are meeting at Rio de Janero, Brazil to discuss ways and means to save the planet for our common survival: This first Earth Summit, is taking place four years after publication of 'Our Common Future' by the UN Commission on Environment and Development (UNCED), chaired by Ms.Gro Harlen Brundland, the then Prime Minister of Norway. The Commission takes note of the early warning environmental signals and calls for immediate and appropriate responses, globally.

The Centre for Science and Environment, Delhi (CSE) has circulated a draft, statement, which is a position paper for the governments of the South and NGOs supporting the third world causes. CSE Global agenda has been widely accepted by southern governments as well as a cross section of environmental groups abroad.

Part I of this paper summarises the CSE position. The summary reveals that the document, a very important one of course, could have been little more analytical in indentifying the causes of the crisis. That is what is attempted in Part II of this paper. The author does not intent to chart out an alternative agenda, for that is left to the imagination and creativity of the reader.

## Summary of CSE Draft

The causes of environmental crisis in developing countries is, according to CSE, "over-exploitation of ground water and surface water, land degradation, deforestation", hence, "given the extreme pressure on natural resource base for daily survival on one hand, and economic growth, on the other, only an extremely well thought out holistic strategy of rational resource exploitation will be able to reconcile environmental constraints with development requirements."

The document is critical of the Northern dominated financial institutions for international trade, aid and debt becoming green linked, with the rich in the world demanding that their dollors and yen be spent in the South only in a way that secures our "common future". (There is no evidence of World Bank etc becoming green-sensitive, except in their press briefings.)

Part II of the Statement contains new visions about the future shape of world, with democratic institutions at three levels, ie. community, national and global. They will be based on community's right to manage its immediate environment through open and democratic institutions and the right to a clean and healthy environment It demanded "a fair world" in which all pay the full cost of their consumption. The draft demands that "all nations at the Brazil conference must take a pledge that they will develop a new tier of governance within their countries a tier of community level governance through open, participatory institutions with inalienable rights over their immediate environment to care for use and manage."

Since the Summit is global, the main agenda revolves around those global issues which need to be resolved immediately. Part II of the statement—the agenda for Global Environmental Democracy- contains two issues which will be raised at Rio, viz. the Global Right to Survival and Equal Right to the Atmosphere. There are two more issues, Right to Information and appropriate compensation for community biological knowledge.

## Global Right to Survival

"Global Right to Survival with a certain modicum of dignity" is the most fundemental of human rights. There can be no discussion of international environmental solidarity as long as the world remains starkly devided between the rich and the poor.

"The vast number of the unemployed in the developing world provide us with an extra ordinary opportunity for undertaking a massive global initiative for ecological regeneration and restoration of the natural resource base on which the poor depend for their survival"

## The Scheme

"If an internationally guaranteed Right to Survival was backed up with an appropriate programme which guaranteed jobs in ecological regeneration, albiet at a survival wage, people need not flee their homes when drought or any other adversity strikes.... Everyone will be ensured a survival wage so that they have the purchasing power to eat. Nobody has to sell off their cattle and other assets in acute distress. Nobody has to go to bed hungry."

The global expenditure for this task has been estimated at US $30 to 40 billion, less than 5% of the global military spending. This money, to be paid by the rich nations "should not be seen as a measure of charity, but more as a measure of the payment that the rich ought to be making for their existing consumption."

According to CSE, over and above the greening of wasteland, this programme will "drastically weaken the forces that engender oppression by freeing people from the clutches of money lenders and landlords." One fails to understand how an employment generation programme, (ensuring just survival wages) will alter the power equation between the landlords and the poor.

## Equal Rights to Atmosphere.

The planet is getting hotter because of the increasing concentration of carbon dioxide, methane, nitrous oxides and chloro-flouro-carbons—the so called green house gases, (ghgs). Carbon dioxide from fossil fuel burning accounts for more than two-third of the green house effect. The USA, the USSR and Western Europe with less that 20% the world population account for 58% global carbon emission. This threat can only be eliminated by bringing down the ghgs emmission to the pre- industrial level, which is not in the international agenda now. The Intergovernmental Panel on Climatic Change (IPCC) recommends a 60% cut in $CO_2$ to hold the concentration at its present level. This will necessitate fixing natioinal quotas. The industrial lobby in the North wants national quota to be based on the current emissions.

CSE argues that the "global aggregate should be allocated to each individual equitably, each nation's quota being equal to the sum of its citizens' quotas. Entitlements thus created can be traded. Those not using their share can sell them to those that are exceeding theirs."

## Analysis of CSE draft.

The draft puts undue blame on the average consumers in the North and refuses to indentify the role of (a) military industrial complex in all countries and (b) rich consumers in the third world who are equally responsible for the green house mess. The draft miserably fails in identifying the contradictions within communities most of which are antagonistic. Every nation in the world today is a battle field with groups of unequal status and power, based on primitive considerations like caste, class, gender and race. It refuses to charge sheet the global Military Industrial Complex (MIC) in dirtying the local and global commons, and of course, increasing the concentration of ghgs. Let us examine these questions in detail in the Indian context

## The Modern Sector In India

India today has an indegenously built mining-manufacturing-nuclear complex, with a death machine, the second largest in the Southern countries, which includes plutonium fuelled bomb and an efficient delivery system. The indegenous people's land have been snatched away for mining, the hazardous wastes are eliminated in the easiest way, air in the industrial cities is as polluted as that of Tokyo. A backward technology, lax environmental laws and inadequate/corrupt enforcing machinery, has virtually destroyed large stretches of farms and forests.

Industrialisation did not bring any radical changes in the country as prophesied by Karl Marx. On the contrary, it has only helped in reinforcing the existing contradictions. At the receiving end of this modern violence are also the traditionally oppressed groups like tribals, the lower castes and women. Urban India does not kill its female infants, instead, they employ the latest in modern medical technology-amniocentesis.

The per capita carbon emission by the an Indian 0.2 tonnes per annum. CSE and some NGOs in the North would like, to consider this as survival emission as against the luxurious emission in the North. Most of the emissions everywhere, is to promote superconsumption and to erect the death machine. If disaggregated emission statistics for the rich and the poor in India is considered, the rich, some 2% of India's total population will be emitting around 2 tonnes of carbon a year.

## India's Record of Democracy

The government of India and those in the states have not been very friendly with people who interrupt their development project The mega disastrous projects like the dams on Narmada and Tehri are literally forced on people, inspite of popular objection. For over a year now, people in Kerala, have been agitating against a proposed nuclear power plant. For over half a decade now, coastal villagers at Baliapal have been protecting their land from the military which wants to build a missile test range. There is an increasing tendency to find military solutions to social and historical problems. Free movement is not possible in around a quarter of India's territory because there are just too many armed men out there.

## The Global Death Machine

Peace Researcher Johan Galtung is of the view that USA is a third world country. "While it is certain that the US still has many rich people and possesses awesome military power, the unyielding unemployment, the 24 million

Americans on food stamps and the one child in five that is raised in poverty outstrips the gloomy realities of many Third World countries. Other indications of this tendency are the grave insufficiencies in health insurance and the extent of functional illiteracy."

The American war machine, which also caters for the military ambitions of the third world, is responsible for more than half the global and local pollution. Since the II World War, USA has spent 2.75 trillion dollars on production and delivery of nuclear war heads alone. Clean up of the Weapons' complexes will cost another 100 billion in 1988 dollars. In an in-depth analysis of US MIC and the health of US economy, Seymour Melman observes: "With a combined address to disarmament and economic conversion we can strike at the heart of the single most dangerous political process of our time. That is the antagonistic co-operation whereby the war-making institutions of the US and the USSR have reinforced each other and generated larger budgets, larger military economies, larger stocks of more dangerous weapons, and in so doing we have justified more centralism, and greater authoritarianism in each society. These processes lead, in both societies, to economic exhaustion and political/moral decay. I know no single public issue that is as crucial for the survival of society as disarmament and economic conversion."

Melman compares the ratio of military capital fund with the Cross Domestic Fixed Capital Formation (money value of civilian capita) items - school buildings, factories, machinery, roads, waterworks, libraries etc.). For every 100 $ spent in civilian sector, MIC amassed 40 dollars in the US. Other major nations - USSR 66, UK 31, France 16, Sweden 12, West Germany 13, Japan 3.3. (Anne H.Ehrilich & John W.Birks (Ed.) Hidden Dangers, Sierra Club, San Francisco, 1990.)

The following statistics will reveal who is belching out more carbon, whether an average consumer or something else.

The table is revealing. Per capita emission of carbon has little correlation with the people's well being or consumption. America has lot of poverty, inspite of being the largest emitter. The second largest emitter is USSR, which is more than double that of Canada. The USA, the USSR and Western Europe with less than 20% of the global population emitted around 60% of carbon. They also happen to be the biggest producers of nuclear energy (three- fourth of the global generation).

The per capita emission statistics have been often used to blame the entire people of industrialised countries. An average northerner does consume much more than what is needed for a meaningful existence. However, disaggregated statistics will reveal that the Global Military Industrial Complex is by far the bigger culprit.

## Implications of the New Carbon Agenda

The present inequality in control over community assets and natural resources at the community, nation state and global level will remain, inspite of Rio summit. How will the new Carbon Agenda, proposed by CSE and supported by third world friendly NGOs abroad affect the poor. This has to be seen in the light of near total surrender of all third world economies to the Northern dominated institutions and the World Bank's recent advice for the hazardous industries to migrate to the developing countries, which are "relatively underpolluted"

It will be in the interest of the third world and the first world elite to set up heavily polluting and energy intensive industries in India, exploiting its vast coal and mineral reserves. Pollution control laws are lax, control agencies are weak and corrupt, environmental awareness is at a low ebb. A faster rate of economic growth can be expected in the third world. Under the existing laiesex faire mood, when socialism has become a bad word, the future generation of misery will also be much faster.

It seems that while thinking globally, the NGOs have forgotten about the local catastrophes from modern technological marvels. For every tonne of carbon emitted, there will be tens of tonnes of other solid, liquid and gaseous wastes, which will kill the local ecosystem. For instance, mining and burning coal alone will increase the radioactive burden of the land and atmosphere by belching out radon and radium. Among other local hazards are sulfter dioxida and fly ash which contains many trace metals which can cause cancer or genetic disorders.

Rio summit, taking place in the 500th year of Columbus, could either vow to strengthen the colonial values and all that came out of the discovery of the New World. Or it could resolve to take the necessary diversion. Those presiding over the heavily armed death machines, gray men in gray suits with bullet proof vests inside will hardly be able to think about survival - except their own. Nor environmental NGOs who speak for their "nations". Healing the earth needs a little more than militant nationalism.

If the Earths summit ends up with carbon quota and survival wages for the green brigade, without addressing to the basic questions, nothing would be lost either. May be it will remind all of us that nineteenth century institutions and ideas are insufficient to look beyond 20th century.

*V. T. Padmanabhan*
*CISEC*
*Kottamukku, Kollam 691013*

## Global Energy and Carbon Balance Sheet

| Country or Region | % Of Global Population (1986) | % of Global Fossil Fuel Consumption (1990) | **Per Capita** Carbon Consumption (Tonne)1990 | % Global Nuclear Energy (1989) |
|---|---|---|---|---|
| USA | 4.98 | 24.80 | 7.24 | 31.18 |
| USSR | 5.77 | 17.70 | 4.47 | 11.25 |
| Australia | 0.52 | 1.4 | 3.92 | 0.0 |
| Western Europe | 7.86 | 16.40 | 3.04 | 35.23 |
| Middle East | 3.58 | 3.40 | 1.38 | 0.00 |
| Latin America | 8.37 | 5.10 | 0.88 | 0.49 |
| China | 22.16 | 9.20 | 0.60 | 0.00 |
| India | 15.84 | 2.40 | 0.22 | 0.43 |

# Chernobyl Revisited—Five Years On

*Zhores Medvedev is a super detective of the nuclear age. His book Nuclear Disaster in the Urals is a classic of scientific detective work which exposed the 1957 explosion in nuclear waste stored in the Urals despite the best efforts of the Soviet authorities to cover up the accident, and the deep scepticism of Western nucleocrats, who thought that an accident of the type described by Medvedev was "physically impossible". The following article which was published last year in the nuclear industry journal, Nuclear Engineering International is a fine description of the conditions around the Chernobyl reactor five years after the accident.*

Last summer, I was invited by the Institute of General Genetics of the Academy of Sciences of the USSR to participate in the First International Conference on the Biological Effects of the Chernobyl Accident. The letter of invitation proudly announced that I was invited to the "world capital of radiation". The conference was planned in two venues—inside the "exclusion zone" in the town of Chernobyl, and at Zeleny Mys, a small working settlement just outside the exclusion zone built for the shift workers who took part in the cleanup operations after the accident. It was to last for nine days, and apart from the discussion of scientific papers, there were to be excursions to the nuclear plant, to experimental stations inside the exclusion zone, and to the radiological reservation which shows the effect of different levels of radiation on flora and fauna. Although there had been little advance publicity about the conference, when it opened on 10 September 1990, the response from the scientific community was impressive. About 250 papers were presented for discussion, about 50 of them from Western scientists.

## Censorship

By 1990, hundreds of papers had been published in Western academic journals on the environmental, agricultural and medical problems related to the radioactive fallout from Chernobyl. The presence of some twenty Chernobyl radionuclides had been charted for each year after Chernobyl in humans, and in the soil, plants, animals and agricultural produce of different countries from Europe, Asia, America and North Africa. In fact, a whole new branch of radiobiology came into existence, because fission radionuclides from a reactor core had never before fallen out over the whole of the northern hemisphere as a result of a reactor accident.

It seemed curious, therefore; that Soviet academic journals in the fields of radiobiology, radiology, radioecology, environmental studies and genetics had remained silent about Chernobyl. For reasons that were not immediately clear, not one academic study had been published in the USSR on Chernobyl related radiobiological problems by 1990. From the outside it looked as if Soviet scientists were missing opportunities and neglecting their obligations. The conference at Chernobyl proved that this was not the case. The problem was censorship.

## Soviet Research

As early as May 1986, more than 30 research institutes of the Academy of Sciences of the USSR, the Ukrainian and Byelorussian Academies, and various other ministries had set up research stations inside the heavily contaminated areas. A significant amount of research was carried out on plants, animals and general ecological problems. Most of the resulting reports however, were classified as secret or marked Tor internal distribution only". In June 1990, the Supreme Soviet passed a new law on the freedom of the press. It banned press censorship and also had a beneficial effect on Soviet academic literature. The majority (but not all) of the studies on radioecology relating to Chernobyl have now been declassified. The exceptions, still considered sensitive information, are reports that contain quantitative data on the contamination of agricultural produce in regions close to Chernobyl and those with details about the health impact.

## Fallout Maps

The first detailed maps of the pattern of caesium-137 contamination of Soviet land were published in 1990. They showed the distribution of caesium-137 towards the end of 1989, when the levels were well below those of 1986 and 1987. Ukrainian and Byelorussian newspapers also published maps of contamination with the other long-lived radionuclides, strontium-90 and plutonium-239/240

The maps indicate that the initial 30 km radius exclusion zone from which people were evacuated in April and May 1986 was significantly amended later. On the eastern side of the accident site it was reduced, while on the western, north-western and northern sides it was extended and many new villages were evacuated in 1987. In 1989, 325 km$^2$ of populated area was still contaminated with caesium-137 levels above 40 Ci/km (1500 kBq/m$^2$ ). Some spots, situated in Byelorussia and Bryansk region of Russia—some as far as 200-250 km from the accident site—had much higher levels of contamination. About 33,800 people live in rural communities in the areas which are designated "areas of strict radiological control". Because they are now approaching the 35 rem "emergency permissible limit" of whole life absorbed radiation dose introduced by the USSR Ministry of Health, they will be resettled in 1991-1995 and the agricultural land in those areas will be reforested.

There is a much larger area of 715km$^2$ outside the exclusion zone where the level of caesium-137 contamination is from 15 to 40 Ci/km$^2$. The 234,000 people who live in this area were entitled to receive clean milk and other produce from uncontaminated regions and they received a small amount of financial compensation. Those benefits and periodic medical checks were recently extended to the 545,000 people who live in the 1409 km$^2$ area where the caesium-137 is between 5 and 15 Ci/km$^2$ . Because the distribution of contaminated spots was random, however, and isolines of different levels of radioactivity often divide the fields and pastures of the same collective farm into several parts, it was finally decided in 1990 that all areas with concentrations of caesium-137 above 1 Ci/km$^2$ would be considered contaminated. The approximately 3,070,300 people who live in those areas receive modest compensation payments of 30 roubles per month.

By way of comparison it is useful to note that the highest level of caesium-137 contamination in the United Kingdom in May 1986 (in a few small spots in Cumbria and North, Wales) was around 0.5-0.7 Ci/km$^2$ and resulted in lamb and mutton being contaminated above the permissible limits for meat sales in the U.K.. The USSR contamination levels were given only for late 1989, they must have been significantly higher in 1986 and 1987.

## Hot Fuel Particles

During the conference, a great deal of attention was paid to the problem of "hot particles" (microscopic insoluble fuel fragments of various sizes). These particles can be trapped permanently in the lungs of individuals who inhale them. In addition to the more homogenously distributed radio-active material, hot particles were present in the Chernobyl fallout in various countries and they were studied quite intensively.

In the Soviet Union, the density of distribution of hot particles and their size was proportional to the distance from the accident site, probably becuase larger particles had a lower capacity to remain airborne. In one study, 50-60 hot particles per square meter were identified on the soil surface at a distance of 50 km from the site in 1988,5 at a distance of 75 km and 2/m$^2$ in Kiev, 130 km away.

Higher concentrations were found west of the reactor than in other directions. In some places the density was 10/cm$^2$ It was also found that larger hot particles were pieces of $UO_2$ fuel grains which were split and dispersed by the first explosion, whereas smaller particles were released with the graphite fumes in the days after the explosion.

Closer to the Chernobyl reactor site there were not only microscopic fuel fragments that created small "gamma fields", 2-5 metre in diameter. A special team of experts is still searching for these "hot spots". When they are found, they are fenced, marked and later deactivated. Walking in the forest outside the exclusion zone, 1 saw several such spots. With my personal dosimeter, I could see that the radiation levels of these spots were several orders of magnitude higher than the forest background levels which were not more than 50% higher than the natural background.

## Inside the Exclusion Zone

It is expected that some parts of the 30 km radius exclusion zone will be suitable for human activity in the future. But there is a smaller; 10 km radius zone within it which will always remain a radiobiological reservation. It is very heavily contaminated, not only as a result of fallout, but because it contains nearly 800 nuclear waste disposal sites, many of them rather primitive. Contaminated equipment, transport vehicles, clothing, topsoil scrapped from about 100,000 acres, asphalt from the Chernobyl station site and the town of Pripyat, trees from the "red forest" (nearly 1,000 acres of pine forest close to the plant and killed by the first radioactive plume), and many other items classified as nuclear waste were buried here in pits and trenches during the second half of 1986.

These disposal sites have begun to leak and contaminate the ground water. There is, **as** yet, no programme for cleaning the whole area.

## The Sarcophagus

The main concern, however, relates to the sarcophagus itself—the reinforced concrete cover built around the stricken reactor. During the conference, some participants managed to get **a** copy of **a** small booklet published in 1990 in Chernobyl by A.A.Borovoi, senior scientist at the Kurchatov Institute of Atomic Energy. Only 250 copies were printed of this summary of a study of the state of the remaining nuclear fuel and the rubble of the destroyed reactor. The aim of the study was to decide what should be done to provide a permanent solution to the problem of the reactor.

The sarcophagus is not expected to last more than 20-30 years. More than 90% of the original nuclear fuel is still inside. The metal structures, particularly those that hang from the 2000 ton top plate that was shifted into a verical position by the explosion, are unstable. By using special periscopes, it was found in 1989 that the reactor vessel is now empty. The bottom plate of the reactor pit was also smashed 4m down by the explosion. Melted reactor fuel was dispersed in different rooms and spaces below the reactor pit However, the melted fuel and radioactive lava which was solid in 1988 is now becoming brittle and softer and changing into dust under the influence of elevated temperatures and radiation.

It was found that the fuel material is subcritical, but its physical instability creates problems because the sarcophagus is not leaktight. It has nearly 1,000 m2 of holes and can "breathe". It contains about 700 kg of plutonium, and about 7 million curies of caesium-137 (81 kg) and 6 million curies of strontium-90 (43 kg).

The Ukrainian government and parliament has passed a resolution demanding that the Ministry of Atomic Energy of the USSR not only shut down the three reactor units still in operation at Chernobyl, but also dismantle the sarcophagus and decontaminate the site. But it has been calculated that this project, called the "Chernobyl green field concept", is too expensive. Moreover, there is no technology available yet to do the job. The Kurchatov Institute of Atomic energy considers it impossible to remove the sarcphagus. The Institute favours the construction of an extra structure, temporarily known as "sarcophagus-2", which will be hermetically sealed and strong enough to withstand the possible collapse of the metal and concrete structures inside the present sarcophagus. It should have a design life of several hundred years. They expect that in the distant future, when caesium-137 and strontium-90 no longer present radiation problems, our descendants might have invented a better technology to dismantle the reactor.

*Zhores Medvedev*
*Nuclear Engg. International,*
*April 1991*

# Ban Ionisation Smoke Detectors

Smoke detectors save lives. Unfortunately the radioactive material contained in ionizing detectors may also pose a threat to life There are two types of smoke detectors availabe for home use—ionizing and photoelectric. Many people are surprised to discover that ionizing detectors contain a radioactive substance, since manufacturers are not required to put the radiation symbol on the exterior casing or packing carton. The Canadian Atomic Energy Control Board (AECB) has determined that "it would not be appropriate-in fact it would be misleading-to place the radiation warning sign on anything other than the source housing itself [which is inside the detector]". The radioactive substance americium ionizes the air within a chamber of the smoke detector, enabling the air to actually carry an electrical current between two electrodes. When smoke particles enter the chamber, the current is interrupted, thus triggering the alarm. By contrast, photoelectric detectors contain a light source, and a light-sensitive photocell that is not directly in line with the light. When smoke particles enter the detector, they scatter the light beam, and the photocell detects the reflected light. This process triggers the alarm.

According to tests by consumer groups, photoelectric detectors are more sensitive than the ionization type in their response to smoldering smoky fires which have larger smoke particles. 75% of fires within the home start as smoldering fires and account for most fire deaths. By contrast, ionizing detectors are faster at detecting the smaller smoke particles of open flame fires.

Ionizing detectors are effective for about ten years. The americium-241 that they contain continues to be radioactive for over 4,000 years. *(The* radioactive half-life of americium is 458 years). Americium, a bi-product of nuclear fission, is extremely toxic-americium is 53 times more radioactive by weight than plutonium 239. Americium emits alpha particles as well as low levels of gamma radiation. Unlike gamma rays, alpha particles cannot penetrate the skin, but they are highly carcinogenic (cancer causing) if inhaled into the lungs, otherwise ingested or imbeded in the skin. Ionising smoke detectors can contain upto five microcuries of americium-241. It has been estimated that one microcurie of americium-241, if evenly dispersed and inhaled has the potential to cause 78 lung cancers. The International Commission for Radiological Protection (ICRP) has set a maximum body burden for americium of 0.03 microcuries.

The large majority of the estimated 40-50 million detectors currently in use in North America are of the ionizing type.

Initially, The AECB required that all detectors containing radioactive material be disposed of in controlled waste areas. This is no longer the case. In 1978, an AECB review determined "that domestic smoke detectors thrown out with the regular garbage were not a concern with respect to the health and safety of the public or waste disposal workers." However, commercial smoke detectors, used in factories, schools and other large institutions, must still be discarded in an 'approved' method, as outlined by the AECB.

According to David Poch, author of Radiation Alert, "the greatest hazard occurs when the americium escapes due to fire, tampering or damage after disposal. If swallowed it accumulates in the liver, bone marrow and endocrine glands, with a corresponding risk of cancer". When we consider that the 40 to 50 million detectors currently in use are starting to accumulate in landfills, it can be seen that disposal is probably the single greatest problem with ionizing detectors. Many of these units may be burned in municipal incinerators, which will further exacerbate the situation.

in this case, for the 4,000 year lifetime of americium. Fortunately however, there is a clear alternative - buy a photoelectric detector instead of the ionizing type. Although it is more expensive, you will get a detector that is better at detecting the most dangerous fires, and you won't be contributing to the radioactive waste problem.

# Principles of Ecology

Properly speaking, global thinking is not possible. Those who have "thought globally" (and among them the most successful have been imperial governments and multinational corporations) have done so by means of simplifications too extreme and oppressive to merit the name of thought. Global thinkers have been, and will be, dangerous people. National thinkers tend to be dangerous also; we now have national thinkers in the north-eastern United States who look upon Kentucky as a garbage dump. Global thinking can only be statistical. Its shallowness is exposed by the least intention to do something. Unless one is willing to be destructive on, a very large scale, one cannot do something except locally, in a small place. Global thinking can only do to the globe what a space satellite does to it: reduce it, make a bauble of it. Look at one *of* those photographs of half the Earth taken from outer space, and see if you recognize your neighbourhood If you want to see where you are, you will have to get out of your space vehicle, out of your car, off your horse, and walk over the ground. On foot you will find **that** the earth is satisfyingly **large, and full** of beguiling nooks and crannies.

If we could think locally, we would do far better than we are doing now. The right local ques-
swers will
global
mish ques-
will this do
unity?"
d the right
the world.
to put lo-
roper rela-
lobe, we
by imagi-
ity, and
, and by
al life as in-
nd self-
s we can —
resumptu-
tions of
ught".
t to keep
ts and acts
ying the
we must
t we do not
ch of the
y part of it
re that we
too much,
arn to live
inde-
pendently and self-sufficiently as we can. That is the only way we can keep the land we

Ionising radiation as a toxic sagent differs fundamentally from toxic substances which can be introduced to a solution slowly and diluted to a lower and lower uniform concentration. By contrast for low energy transfer radiations such as X-rays and beta particals, the minimal unit is the primary ionisation track led by a single high speed electron. The electron cannot be subdivided and it cannot make its delivery of energy more gentle by diluting it evently throughout the whole cell—it is abrupt and very close to the primary track. For example, just one gamma ray photon of caesium-137 of 662 kev energy results in the dilivery of 79.2 millirad of dose to some 91 cells and this energy delivery is typical of that delivered by every microscopic high speed bullet from smoke detectors. The microdose of 0.00001 mSv or 0.001 millirad is delivered to the whole body and this includes many cells not traversed at all by the electron. And the track dose of 79.2 millirad is 79200 times the person dose, and would be the cause of fully competent carcinogenic lesion. There is no dose which would be safe for us from radiation-induced cancer. - Adapted from Goffman J.W. (1990). *Radiation-Induced Cancers from Low Dose Exposure: An Independent Analysis*

Committee for Nuclear Responsibility
P.O.Box 421993 San Francisco California 94142

are using, and its ecological limits, always in sight.

The only sustainable city—and this, to me, is the indispensable ideal and goal—is a city in balance with its countryside: a city, that is, that would live off the net ecological income of its supporting region, paying as it goes all its ecological and human debts.

The cities we now have are living off ecological principal, by economic assumptions that seem certain to destroy them. They do not live at home. They do not have their own supporting regions. They are out of balance with their supports, wherever on the globe their supports are.

The balance between city and countryside is destroyed by industrial machinery, "cheap" productivity in field and forest, and "cheap" transportation. Rome destroyed the balance with slave labour; we have destroyed it with "cheap" fossil-fuel industries.

Since the Second World War, the norms of productivity have been set by the fossil-fuel industries.

Geographically, the sources of the fossil fuel are rural. Technically, however, the production of these fuels is industrial and urban. The facts and integrities of local life, and the principle of community, are considered as little as possible, for to consider them would not be quickly profitable. Fossil fuels have always been produced at the expense of local ecosystems and of local human communities. The fossil-fuel economy is the industrial economy par excellence, and it assigns no value to local life, natural or human.

When the industrial principles exemplified in fossil-fuel production are applied to field and forest, the results are identical: local life, both natural and human, is destroyed.

Industrial procedures have been imposed on the countryside pretty much to the extent that country people have been seduced or forced into dependence on the money economy. By encouraging this dependence, corporations have increased their ability to rob the people of their property and their labour. The result is that a very small number of people now own all the usable property in the country, and workers are increasingly the hostages of their employers.

Our present "leaders"—the people of wealth and power—do not know what it means to take a place seriously: to think it worthy, for its own sake, of love and study and careful work. They cannot take any place seriously because they must be ready at any moment, by the terms of power and wealth in the modern world, to destroy any place.

Ecological good sense will be opposed by all the most powerful economic entities of our time, because ecological good sense requires the reduction or replacement of those entities. If ecological good sense is to prevail, it can do so only through the work and the will of the people and of the local communities.

For this task our currently prevailing assumptions about knowledge, informations, education, money, and political will are inadequate. All our institutions with which I am familiar have adopted the organizational patterns and the quantitative measures of the industrial corporations. Both sides of the ecological debate, perhaps as a consequence, are alarmingly abstract.

But abstraction, of course, is what is wrong. The evil of the industrial economy (capitalist or communist) is the abstractness inhereant in its procedures—its inability to distinguish one place or person or creature from another. William Blake saw this two hundred years ago. Anyone can see it now in almost any of our common tools and weapons.

Abstraction is the. enemy wherever it is found. The abstractions of sustainability can ruin the world just as surely as the abstractions of industrial economies. Local life may be as much endangered by "saving the planet" as by "conquering the world". Such a project calls for abstract purposes and central powers that cannot know, and so will destroy, the integrity of local nature and local community.

In order to make ecological good sense for the planet, you must make ecological good sense locally. You can't act locally by thinking globally. If you want to keep your local acts from destroying the globe, you must think locally.

No one can make ecological good sense for the planet. Everyone can make ecological good sense locally, if the affection, the scale, the knowledge, the tools, and the skills are right.

The right scale in work gives power to affection. When one works beyond the reach of one's love for the place one is working in, and for the things and creatures one is working with and among, then destruction inevitably results. An adequate local culture, among other things, keeps work within the reach of love.

The question before us, then, is an extremely difficult one: How do we begin to remake, or to make, a local culture that will preserve our part of the world while we use it? We are talking here not just about a kind of knowledge that involves affection but also about a kind of knowledge that comes from or with affectioin - knowledge that is unavailable to the unaffectionate, and that is unavailable to anyone as what is called information.

What, for a start, might be the economic result of local affection? We don't know. Moreover, we are probably never going to know in any way that would satisfy the average dean or corporate executive. The ways of love tend to be secretve and, even to the lovers themselves, somewhat inscrutable.

The real work of planet-saving will be small, humble, and humbling, and (insofar as it involves love) pleasing and rewarding. Its jobs will be too many to count, too many to report, too many to be publicly noticed or rewarded, too small to make anyone rich or famous.

The great obstacle may be not greed but the modern hankering after glamour. A lot of our smartest, most concerned people want to come up with a big solution to a big problem. I don't think that plantetsaving, if we take it seriously, can furnish employment to many such people.

Some cities can never be sustainable, because they do not have a countryside around them, or near them, from which they can be sustained. New York City cannot be made sustainable, nor can Phoenix. Some cities in Kentucky or the Midwest, on the other hand, might reasonably hope to become sustainable.

To make a sustainable city, one must begin somehow, and I think the beginning must be small and economic. A beginning could be made, for example, by increasing the amount of food bought from farmers in the local countryside by consumers in the city. As the food economy became more local, local farming would become more diverse; the farms would become smaller, more complex in structure, more productive; and some city people would be needed to work on the farms. Sooner or later, as a means of reducing expenses both ways, organic wastes from the city would go out to fertilize the farms of the supporting region; thus city people would have to assume an agricultural responsibility and would be properly motivated to do so both by the wish to have a supply of excellent food and by the fear of contaminating that supply. The increase of economic intimacy between a city and its sources would change minds (asuming, of course, that the minds in question would stay put long enough to be changed). It would improve minds. The locality, by becoming partly sustainable, would produce the thought it would need to become more sustainable.

# Another Wicket Down

## The Oldest Operating Reactor in US Faces Closure

The Board of Directors of Yankee Atomic has decided to close its Yankee Rowe reactor permanently rather than spend the money to repair or even to fully investigate its embrittled reactor vessel.

The board's decision followed a last ditch, and unsuccessful, utility effort to convince the Nuclear Regulatory Commission (NRC) to allow the reactor to operate for at least one more fuel cycle without modifying the vessel.

The Yankee Rowe reactor had a book value of only $28 million, and just determining the vessel's con dition was expected to cost about $23 million. If the vessel needed replacement or annealing, the costs could have risen to $ 100 million or more-clearly daunting numbers to the utility's board. And with no US precedent in this area, there was no guarantee that replacement of the vessel was either politically (because of potential worker exposures) or technically feasible, while annealing has not been tried in the US either.

The decision shook the nuclear industry, which just a year ago was touting Yankee Rowe as the ideal reactor to initiate the NRC's license renewal process. Its relatively good operating record, particularly given its status as the nation's oldest operating reactor, would help it lead the way towad a new generation of extended licenses Like a fine wine, the industry argued last year, Yankee Rowe improved with age.

In this case, however, the fine wine quickly turned to vinegar following an investigation of the plant by the Union of Concerned Scientists (UCS). The organization found that the condition of the reactor's pressure vessel could not be determined, and certainly did not meet NRC regulations. UCS and the New England Coalition on Nuclear Pollution filed a petition to close Yankee Rowe until its vessel clearly met the rules. After several months of hemming and haw ing and defending the plant, the NRC finally agreed with UCS last September and the utility "voluntarily" closed the plant rather than face an NRC shutdown order.

Ironically, the US Council for Energy Awareness (USCEA), the nuclear industry's public relations arm, currently has advertise ments running in major magazines promoting nuclear power with a photograph of Yankee Rowe in a pastoral forest setting. Perhaps realizing the inevitable outcome, CEA "Whited out" the Yankee Rowe nameplate in front of the plant.

Northern States Power's Monti cello reactor now becomes the lead industry plant for license renewal An application for renewal is expected to be submitted sometime this year. As a highly controversial GE Mark 1 design, (the same de sign as Tarapur-Editor) which many nuclear experts believe never should have been built in the first place, Monticello can expect a thorough examination of its technical condition and basic design. If the Yankee Rowe experience is any indication, Northern States can expect anything but smooth sailing in the renewal process.

In fact, given Yankee Rowe and last month's agreement to close the aging San Onofre-1 reactor rather than spend millions on modifications, it appears that closing older reactors rather than up grading them makes sense for ratepayers and utilities alike,

### A New Pair of Crutches

In a remarkable perversion of the concept of "free enterprise", the US Department of Energy has agreed to pay half the costs of developing non "advanced", non-" meltdown proof new reactor designs for three of the nation's largest corporations. The designs include General Electric's Advanced Boiling

Water Reactor and Simplified Boiling Water Reactor, Westinghouse's AP 600 Pressurized Water Reactor and ABB- Combustion Engineering's System 80 Pressurized Water Reactor. Actually, the ABB-Combustion Engineering is not even a US design, since primary owner ABB (Asea-Brown-Boveri) is a Swedish company. ABB has also been implicated in the diversion of nuclear technology to Iraq. All of the designs are light-water reactors, and are merely updates of existing designs. None meet the "meltdown-proof criteria often advanced as a prerequisite for new reactor construction.

The initial phase of the contract is expected to be $200 million over five years. The DOE decision came about because, according to Assistant Secretary for Nuclear Energy, William Young, "...the industry made it clear that without cooperation with the government, the industry would not be able to do the development work required to make available the next generation of light water reactors". Apparently the DOE did not consider that if the industry doesn't think it would be profitable to develop these new reactor designs, then perhaps the taxpayers wouldn't think so either.

*The Nuclear Monitor*
*March 9,1992*

# Heavy Going For Heavy Water Board

The production figures at the end of the financial year flowing into the heavy water board offices at Trombay reveal that with only 273 tonnes of heavy water produced during the last year, the Department of Atomic Energy (DAE) is over two-thirds short of its target.

Coded confidential dispatches to the board from each of the eight heavy water plants scattered around the country also show that, at crores of rupees per tonne of heavy water produced, the DAE must be running one of the world'ss most expensive heavy water programme.

For example, when the Manuguru heavy water plant at Andhra Pradesh was commissioned in December last year, over Rs 650 crores had been spent on it, and it was already nearly four years behind schedule. Begining last April, when it generated about 100 kg of heavy water, the Manuguru plant has, until February this year, produced only about 35 tonnes of its full capacity of 185 tonnes per year. Each tonne thus costs about Rs 19 crores.

Yet, speaking to this newspaper yesterday, the secretary of the DAE, and the chairman of the Atomic Energy Commission (AEC), Dr P.K. Iyengar, stated that during the last two weeks, "The plant has been functioning up to 85 percent of its capacity. Ofcourse, this varies depending upon the pressure."

More shoking than Manuguru is the state of the Talcher plant. Ever since it was commissioned in 1984, it has not generated more than about 10 tonnes of heavy water. Its scheduled capacity is stated to be 62 tonnes per year, and even that is derated from the original 67; thus the Talcher plant has generated till February this year, only about 3 per cent of the amount of heavy water it should have produced by now. Not far better is the condition of any other of the heavy water board's plants. The most efficient is Tuticorin, operating at about 84 per cent. During the year from April 1991 to February 1992, this plant generated about 41 tonnes of the precious fluid, as against its capacity of 49 tonnes.

Also among the star perfofmers, with an efficiency factor of 75 per cent, thanks principally to the fact of having been derated over time from a capacity of 14 tonnes annually to one of about 8 tonnes today, is Nangal in Punjab, the country,s oldest plant, put up in 1962.

"The country's first drop of heavy water was manufactured there," according to board officials, and making use of the supposedly most expensive "water-hydrogen sulphide" technique, Nangal has produced during the last year, from April to February, just under six tonnes of heavy water.

Next in the league table with an efficiency factor of 67 percent is Kota, which during the year, generated about 57 tonnes, as against 85. Hazira follows, with a 60 per cent efficiency. Next comes Baroda (44 per cent) followed by Thal (43 per cent), with Manuguru next and Talchar last.

Work on Manuguru began in 1982, and was scheduled for completion in five years. Had it been commissioned On schedule, it would have by now produced 740 tonnes of heavy water. Instead it has managed just five per cent of that amount.

At a recent seminar at Trombay, the heavy water board's cheif execcutive, Mr. G.M. Sundaram, bent over to touch Dr. P.K. Iyengar's feet, under the astonished gaze of scores of heavy water board engineers and scientists.

During the last year, the former general manager of the Manuguru plant, Mr Mohinder Singh, pointed out a number of financial irregularities in the functioning of the plant, and recommended an enquiry into them. However, he was simply shifted to the board's office in Bombay, and nothing further was done.

Mr Singh has inferred, in a July 1991 letter to Dr Iyengar, that the executive direcctor in charge of Manuguru, Mr. S. Sharma had taken a decision to order 16 different kinds of tests on the transformer oil being used at Manuguru in the face of advice from juniors that all but a quarter of these tests were of no practical value, and essentially academic.

It further emerged that the company which had been contracted to do the job at nearly Rs 9 lakhs, Esquire Engineers and Consultants of Madras, had no facilities to do it, and was simply farming oil samples out to government-run laboratories for testing. All this inspite of the fact that test facilities existed at Manuguru itself.

"We can save time and money by collecting the samples and sending them to either Bangalore or Hyderabad for test results. Under the circumstances, it is considered that giving oil samples to Esquire is not at all economical," Mr Mohinder Singh says, in his letter to Mr. Sundaram, a copy of which was sent to Dr Iyengar.

Totally. 11 different kinds of corrupt practices are detailed, and an inquiry recommended into them. Among these is a case of overpayment to a Calcutta firm to the extent of Rs 4 lakhs, which is described as "being not an isolated case$^{0}$.

Speaking to this newspaper, Dr Iyengar said that he was unaware of the specific details of the alleged irregularities. Subsequently he stated that he had asked the board cheif executive, Mr Sundaram, to look into them, and was satisfied that they were baseless.

Dr Iyengar estimates that 250 tonnes of heavy water are needed to run each nuclear reactor. But last year the whole complex heavy water manufacturing structure has generated only enough to run just one nuclear reactor

*Clarence Fernandez*
*Times of India*
*March 3, 1992*

## Letter Box

The cycle yatra from Gujarat to Kerala to commemorate Chernobyl day is very timely and important,

Inspite of efforts like this from people's groups the government is not paying any attention to the fact that nuclear power is dangerous to our nation. When they do not learn from others' experience then maybe they will learn by some terrible blow."

*Kantilal* Yora, *Ahmedabad.*

Like the Anumukti issue Vol.5,No.2, you are running arround and working hard for analysing the Rawatbhata Survey results. Doctors went to Khetpalia village recently and did a check up and distributed medicines to the sick people. People are awaiting eagerly for Rawatbhata Survey *report* Our students learnt a lot during the survey. It was an enriching experience for them."

*Rampratap Gupta*
*Rampura,*

"We were caught up with helping with the Narmada Bachao Andolan's programme, so I could not reply right away. About 350 people from the valley were here for 2 days along with Medha and other activists. It was a hectic time but worth it Besides other things, they wanted to draw attention to the eviction notice for Manibeli,. the last date being 31st January. Some of the villagers also returned their "pattas"/papers to the State revenue minister stating that they would join the others in their stand of not vacating their lands under any condition. A dialogue between the government and the Anodlan, and a demand that the project be reviewed was made.

Some of us from Bombay have initiated a restructuring of the Andolan's Bombay support groups working. The process is in full swing right now. We are pushing for a greater participation of people, since there are many potential participants (they just need to feel welcome and be encouraged)

Furthermore, such movements also need to develop a wider orientation considering the problems of sustainability, and the faulty pattern of development -so as to lend and share support to other similar groups like yours in a more active manner-to finally develop ONE united front. What do you think? Your comments would be valuable, because you both *truly* live and understand these concepts.

The Cycle Yatra 'Bombay part mainly) may be one of the initial testing grounds to see how this kind of "widening" process can lend support 1 must emphasize here that though things are happening, the above thoughts are my personal perceptions coupled with positive thinking. 1 think others share them too."

*Mona Patrao, Bombay*

In Goa the last of our beautiful beaches are going to be invaded by big projects.. For example, the Japanese intend to build villages on our soil for their old. Age old settlements of people are going to be deprived of their grazing grounds, free access to the beach, fruit, fuel and foliage of the hill slopes, scarce water resource and huge chunks of precious land The rapid urbanisation, and influx of people further disrupts the way of life of the people and our unique ecology. All this at tremendous financial cost to us by way of incentives, subsidies, cheap land, water, electricity and cheaper labour.

What do you think we should do as follow up to the Consultation on Tourism in Goa? Is it possible to stall this international juggernaut? Let's have your thoughts."

*Gemma de Sa*
***Goa***

"Irfan Engineer has been workiug among Dang tribals for quite sometime. He organised them and fought for their long-standing demands forcing the Government of Gujarat to give **a** serious thought to tribals' demands. However, the corrupt forest officials were waiting for an opportunity to take revenge.

On 2nd January, 1992 Irfan and Virsingh tribals sat on indefinite fast demanding compensation for Tarabai who was killed when the tribals were agitaing *for* their demands and police opened fire. Also, the fast was undertaken to demand arrest of those forest officers who asked police to fire without any reason.

On 9th January, 1992 the Gujarat police arrested Irfan and Virsingh under NSA and put them in Baroda Central Jail. Undertaking indefinite fast is a perfectly legitimate democratic method. There cannot be a more peaceful protest than this and yet they have been arested under NSA. One fails to understand how NSA can be applied in such case. It is gross misuse of NSA.

May I, therefore, request you to kindly protest against this high-handed behaviour by sending telegrams to Home Minister Shri. S.B.Chavan and Chief Minister of Gujarat Shri.Chimanbhai Patel. You may also write to Irfan Engineer, C/o.Superindendent of Baroda Central Jail, Baroda, Gujarat."

*Asgharali Engineer*
*Bombay*

"My suggestion to you during the cycle yatra would be to keep in touch with grassroot groups, so that the movement grows instead of just organising workshops and allowing people like Narayanbhai to come and lecture. The yatra participants' sharing will be much much more effective and give a boost to the movement."

*Nicky Cardoza*
*Bombay*

"I have gone through the details of Cycle Yatra organised by Sampoorna Kranti Vidyalaya to commemorate the Chernobyl Day. I am sending my good wishes to this programme."

*Babubhai Jasbhai Patel*
*Gandhinagar.*

I have gone through all the news and articles on health effects of Rawatbhata nuclear power plant on the people of surrounding villages. I am sorry that I can't participate directly but kindly accept the monetary contribution as my support effort."

*Dr.Mihirbhai Joshi*
*Visnagar*

Unfortunately I am unable to join the Cycle Yatra because of organisational responsibilities. I am sending my suggestions for the Cycle Yatra. (1) Always keep some food with you. (2) Have water bags for everyone (3) Keep addresses of young people you meet on the Yatra for follow up actions (4) Keep materials to write slogans on the walls and rood."

*Bhagyadhar Baij*
*Orissa.*

"**I** am working with Sarvodaya drought relief commettee, Orissa. I would have very much liked to participate but the committee has not given me permission. Would you request them to let me go,"

*Pramod Mudali,*
*Orissa.*

"We feel that if you had planned it with some more advance notice, it would have been possible to plan the yatra more effectively and have greater participation. This was based on the experience in the two previous yatras, viz. the Save the Western Ghats March (SWGM) during November 1,1987 to January 30,1988 and the Kanyakumari March during April 2 to April 30, 1989 and both of these were coordinated by the Samaj Parivartana Samudaya at the Karnataka State level with the active cooperation of various other voluntary groups especially the Federation of Voluntary Organisation for Rural Development in Karnataka (FEVORD-K). We have appreciated your open invitation to make yatra our own and help in whatever way possible."

*S.R.Hiremath,*
*Janvikas Andolan, Karnataka..*

## Subscription Rates:

Rs 25/- per year South Asia
U.S. $15/- or equivalent in other convertible currenencis (airmail overseas)
(Rs.300/-per year if paid for in India)
Rs 250/- for life (only within India)
Please add Rs 6/- for cheques
Drafts should be drawn on State Bank of India, Valod (code no 0531)
Editor: Surendra Gadekar
Subscriptions, donations, manuscripts, inquiries regarding circulation, etc., should be addressed to:
Anumukti
Sampoorna Kranti Vidyalaya
Vedchhi, Dist: Surat 394641 INDIA
Published by S. Gadekar for Sampoorna Kranti Vidyalaya, and printed at Meghna Arts, Bombay.

PRINTED MATTER BOOK POST

# ANUMUKTI

## A Journal Devoted to Non-Nuclear India

volume 5 Number 5 April/May 1992

**Analysis**

## Some Problems and Prospects Facing the Antinuclear Movement

It is doubtful whether an antinuclear "movement" worth the name has so far evolved in India; yet there are groups taking up nuclear issues all over the country. These are mostly middle-class oriented city groups. The poorer classes on the other hand, have not participated in the work of these groups. Therefore, antinuclear groups always face a dearth of activists to continue their work persistently.

There have been ups and downs in each antinuclear upheaval in the country. Due to constraints of men and material there has not been any continuous or sustained work in most cases. To keep people active, there is a need for programmes. Most groups have limitations that they have not been able to overcome successfully. Financial constraints have crippled many a group that could have put in commendable work. The apolitical nature of the antinuclear groups and their general indifference to pressing problems like price rise and increasing unemployment have made mainstream political parties sceptical of them. The masses generally share this scepticism about antinuclear and environmental groups. They have no faith in many of these groups, as these are not addressing directly felt needs like the drinking water problem and are not suggesting workable solutions. Lack of information and the consequent inability to counter effectively certain apparently pertinent points raised by the government, the pronuclear antienvironmental lobby, and a section of the press, cast a few activists in a bad light in the eyes of the public Activists suffer due to the lack of effective communication among themselves; on the other hand, the media has let loose a propaganda blits for anti-people programmes in the name of "progress" and *"development"*

### Problems with special reference to Kerala

Though economically a poor state and industrially not well-developed, Kerala has achieved a level of literacy and health status comparable to those of a few developed countries. This in turn has promoted a kind of consumerist, urban middle-class culture throughout the sate. It is a veritable sellers market for all consumer {pods, and people's life style has been considerably affected and influenced by the flood of manufactured goods. Therefore, any call to change the present life style will fall on deaf ears. "We cannot turn the clock back" people say, and activists are viewed with suspicion.

The people of Kerala are highly politically concious and they are all affiliated to one party or the other. All mainstream parties have unfortunately a concept of development which is similar to that propagated by the World Bank and the International Monetory Fund. According to that concept, nuclear plants mean more electricity; more electricity means more industry; more industry means mora employment. To the people of the state which faces acute unemployment problems Especially among the educated, any scope for employment is quite appealing and irresistable, despite all the attendant occupational hazards and environmental pollution. This is the rationale behind the Deration of Indian Rare Earths (IRE) and other hazardous and energy intensive industries in the state. It is an arduous task to convince the people that the present sort of "development" cannot solve the problem of unemployment or for that matter any problem Mass print media causes a great deal of damage by dubbing those who oppose the present mode of development as "anti-national" and "anti-people". In Kerala, where everybody is addicted to the daily newspaper and tends to believe the printed word, activists need to be extra-careful to avoid being misunderstood.

There are differing perspectives among environmental groups themselves. Some take extreme "fundamentalist" and "purist" stances, which do not appeal to the people at all. Certain groups vehementaly oppose dams and deforestation, but are rather lukewarm on the nuclear issue. There is no common shared perspective or an integrated approach towards alternative modes of development. Consequently, many groups oppose particular projects with sectarian and regional biases. The antinuclear group of Bhoothatthankettu in Southern Kerala, for example, is not opposed to a nuclear plant coming up anywhere else. Various groups cultivate a sort of personality cult, and certain persons are projected as "heroes". These people think they are infallible and they sit in judgement on others. There is a lot of destructive criticism spewed out by such groups. These groups themselves do nothing, but simply create the impression that they are doing something by their public relations exercises in the press and the media. People who are earnestly doing something, and devote much of their time to antinuclear work, get disgusted with these self-advertisers and are in fact ashamed to be seen by the public as one among3t these so-called "activists".

People at large are confronted daily with innumerable problems like unemployment and rising prices of essentials. The structural adjustment programme has inflicted on them innumerable burdens in quick succession. They are not able to cope with the speed with which these economic measures are being implemented. They are shocked and paralyzed to such an extent that they cannot divert their attention to anything else. A general apathy and indifference to environmental issues exists as many think that these problems are not their concern; they think that is for the scientists or the government or the "movement" to take care of these issues. However, this attitude is changing, though slowly. Many champions of the antinuclear cause, though they are active in various cultural, literary and other social activities, are not so deeply committed to the nuclear issue that they can get involved in struggles. They are reluctant to work among ordinary people; as "stars" they stand aloof. People in turn suspect their motives. There is a credibility crisis. When a political leader with a past record of struggle and sacrifice, says something, even if it is utter nonsense, people tend to believe it; while they are sceptical of these stars who are not prepared for any sacrifice at all and who do not get directly involved in organising people

Raising financial resources is a formidable problem in the state. People will give money when there is a live political issue. At other times the movement has to be kept alive with meagre contributions. Often the workers face extreme hardship.

In any group there are only a few who work with deep conviction. They have to do everything. Added to this when money becomes a pressing problem, many workers feel helpless and slowly withdraw from the movement.

Though these are the problems, the experience with the movement against the Peringome nuclear power plant illustrates that one need not lose hope at all. Peringome demonstrates clearly that:

A sustained struggle is possible, if a group Is determined to go ahead with the work, and like-minded, groups support it. People can gradually get a perspective of our wrong mode of development. Even monolithic political parties will be compelled to review and readjust their positions when they find that people are really concerned about the nuclear issue and are prepared to fight against the power plant at all costs. People matter the most: if they put up a united struggle sinking all differences, no government in power can ignore it.

The struggles should not be seen in isolation but need to be placed in the global political context. The antinuclear issue, for example is a powerful political issue in the sense that it gives scope for exposing the strong neo-colonial interests dictated by the IMF and the World Bank, the interests of multinationals, and of the "new world order" which among other things aims at dumping hazardous industries and wastes in the Third World. Export of nuclear technology to Third World countries needs to be seen in the proper political perspective and people need to be convinced of the irrevocability of the mega hazards in all spheres — economic, political and ecological. Viable alternatives to nuclear power need to be demonstrated. It is strategically important in winning the support of people who want to continue their consumption patterns and at the same time want to be converted to an antinuclear position.

*K.Ramachandran*
*Indivaram, Payyanur, Kannur*

# Anumukti Cycle Yatra

The crowning moment of the cycle yatra for me came unexpectedly when it was already all over. We had received a hero's welcome in Payyanur and in Peringome. The two day convention of antinuclear activists called at Peringome had ended. We had sold our bicycles and were all set to go home. Manoj, one of the fulltime participants in the cycle yatra, invited us to visit his home at Taliparambha, a small taluka town some twenty kilometres from Payyanur. We had travelled in a bus and after the lovely cycling it all felt both strange and a bit distasteful. We got down at the bus stop in Taliparambha and were about to proceed to Manoj's house. He asked us to wait for a while, so that he could buy a few provisions before the twenty of us would descend unexpectedly on his parents. As we were waiting at the bus stop, there were curious glances from onlookers. We were no doubt a strange sight - our dresses had antinuclear slogans painted on them. And then, suddenly, things started falling into place. We started singing:

*Uru uru ser beku*
*Oggatu aag beku*
*Anu Sthavara Nilessa bekanna...*

*(Come, come and get together*
*People need to unite together*
*We don't need nuclear power plants)*

Suddenly we were all singing and dancing and there was a crowd of around two to three hundred people watching us. And some from the group were distributing leaflets, selling books and copies of *Anumukti,* and somebody had taken a hat around and made a collection. We were unfortunately not carrying our megaphone at the time. But, that lapse made no real difference. We gave speeches, sang songs, danced a little more. At that moment, I knew that what one really needs in a cycle yatra are not cyclists or even cycles but a group of people who act like a team and who are trained to communicate. And finally at the end of our journey, we were a team.

## The Group

We had started some five and a half weeks previously, a mixed group: there were five (four boys and a girl) adivasi youth from villages around Kakrapar; there were the three students of Sampoorna Kranti Vidyalaya, (one each from U.P., Orissa, and Kerala); there were two who had taken leave from their jobs in Ahemdabad and had come; one had come specially for the yatra all the way from Kerala because he felt that if people from Gujarat could come to protest against a plant in Kerala, he could certainly do the same; and there were five from the staff of the Sampoorna Kranti Vidyalaya and there was my young daughter. Twelve of us were on cycles, two on a motor cycle and the rest were accompanying travelling in buses. However, till the Gujarat border, our hosts on the way sent us some vehicle, usually a jeep or a car. As we proceeded, some had to drop out and return to the real world but others joined in the way.

Two actiivists got married in Delhi on the 10th of April and departed for Goa on the 11th to join us there. Even a horse representing the entire non-human animal kingdom joined us for a short while in Ankola (he found the heat overpowering); Bharat was at two and a half the youngest member of the yatra. He joined us from Honnavar. Many joined us for the last two days in Kerala and in Peringome there were more than a thousand people for the final stretch.

## The Route

Our route took us through some really beautiful and breathtakingly oceanic parts of the country. We started from Vedchhi and then travelled southwestwards through Vansda and Dharampur to meet the sea at Daman. After that, all along the route, the sea was our constant oompanian. So, for the most parts were hills of the Western Ghats and jungles From Daman our route took us to Tarapur and then on to Bombay where we staved for three days. Then, through Panvel and Pen up to Mangaon, on Highway 17. Then we took a diversion and got off the highway and went through Ambet and Mandangarh to Dapoli. From there on to Ratnagiri, Malvan and Vengurla before entering Goa in Pedne. We stayed four days in Goa travelling not directly southwards down the coast but visiting various groups in Mapusa, Panjim, Madgao, Ponda and Cancon areas. We entered Karnataka at Karwar and then took a detour to Kaiga. There we took two days off our cycles and travelled in a bus and a truck to Yellapur, Sirsi, the Bedthi dam site and other places in the hills before returning to our cycles at Ankola. From then via Kumta, Honnavar, Bhatkal, Baindoor to Udupi, Mulki and Mangalore. Kerala was our destination and all along the route we had kept chanting.

*Kahan chale bhai kahan chale?*
*Gujarat se Kerala chale*

We entered Kerala at Thalicheri and stayed one night at Kasargod and the next at Payyanur. The yatra culminated at the proposed nuclear power plant site at Peringome.

It was a cycle yatra where half the yatris fell sea-sick! There were a lot of ferry crossings and the one near Vijaydurg involved crossing the open sea.

The route was sceanic no doubt, but it was also full of ups and downs. At times, this could be quite tiring. Though coming downhill at great speeds was an exhilerating and a not to be missed on any account kind of experience, but then it was soon invariably followed by climbing steep slopes pushing the cycle. This, especially in the hot Sun was not something to be cherished, though I feel that it is the memory of such climbs especially the ones on the road between Malvan and Vengurla which would remain with me for a long time.

## Ups and Downs

Our mood too like the road during the yatra, was sometimes way up and sometimes deep down. There were times when people fell ill Bachhi Singh fell from his cycle while going downhill at great speed near Ambet and had to have stiches. Vinayak slipped and fell on the road in a crowded street near Borivali in Bombay and then I collided with him. He was bleeding profusely and just then a person came up to me and started arguing that the cycle yatra was not in the national interest since it was against development! But the hardest part of the journey was not the physical hardship involved but rather the stresses and strains of group dynamics: Of people in the group, oneself included, being selfish and not acting in the best interest of the group. There were times when some dirty linen got washed in public. But then there were the highs—moments of pure ecstasy which one would not miss for anything in the world—moments of inspiration.

The most exhausting and trying day of the cycle yatra came early on. We had entered Maharashtra and spent the night at Dahanu. Originally, our schedule was to have the night halt at Chinchani—a small village just two kilometres from the Tarapur Atomic Power Station. However, local hhosts had made some changes and Anand, our local organiser, was to meet us at Boisar railway station at Ten O'clock in the morning.

Wo started from Dahanu at 5.30 in the morning and proceeded to Chinchani. The morning air was cool and we made good progress. Reached Chinchani in time for breakfast and distributed a lot of leaflets. From Chinchani we went to Boisar via Tarapur, shouting slogans most of the way especially when we spied some power station vehicle. We reached Boisar station in time to meet the morning train which brings nuclear workers and had a well attended street meeting. Anand met us and he informed us that our night halt was at a village called Nandakhal, which was another eighty-five kms distant. We had already covered around forty five kms till then in the morning. His suggestion was that we should all go in a train up to Virar and then go further on cycles. However, these were early days of the yatra and none of the yatris were willing to even consider this proposal. Instead, we asked around if there was a shortcut, and somebody suggested an alternate route over a new bridge which had been constructed over the Par creek. He claimed that this route would save around 30 kms. Of course, the tourist map of Maharashtra that we had was totally useless in this situation. All of us were game for this plan and so alter a quick lunch at Palghar we were off, braving the hot noon sun. A little distance down the road, Manoj felt sick and started vomiting. So, we rested for a while in a small village on the verandah of a house by the side of the road. The women of the house were very hospitable and offered us tea and we talked about the problems caused by industrial pollution, salt pans and especially radioactive pollution from Tarapur. We left alter Manoj felt a little better and was able to ride pillion on the motor-cycle, while Uma took his cycle.

Soon alter leaving Safale, we had an unpleasant surprise in store. The road started climbing and a huge hill loomed ahead. None of our guides had even whispered a word about the road being hilly. We went up and then down again alter enjoying the fantastic view and crossed the bridge on the Par creek. And then our problems began. There was a small mud track going south, while the tar road that we had been travelling on, turned northwards opposite to the direction of our destination. We asked a lot of people directions, but they were all unanimous in recommending the tar road. The mud track they claimed did not go anywhere. The highway is just some ten kms away and you will have to catch that There is no other way." Well, we cycled on, but after cycling well more than ten kms, there was still no sign of the promised highway. The site, just then of a small canal by the side of the road was like nectar to our eyes. We all waded in and had a most refreshing bath and were ready to face the road once more. "How far is the highway", we asked. "Oh, just another ten kms," was the entirely predictable answer.

By the time we reached the highway, it was dark already, and all of us were ready to drop off. Virarnaka was another seventeen kms down the highway we learnt. We were wondering what to do, with most of us in favour of spending the night beside the road, when suddenly a truck stopped and out stepped Anand. "Your food is all ready and waiting for you at Nandakhal," he said. Now there was no opposition at all to the suggestion that the cycles be loaded on to a truck and we all go to Virar-naka. The problem was how to get a truck to stop and listen to our proposition.

We walked to a dhaba some hundred yards down the road and explained our plight to the owner, who happened to be a Sardarji. "No problem at all," he said. "I will see that you set there. He talked to two truck drivers who had retired there for the night and miraculously we were all loaded and off within a few minutes. To top it all these friends refused any payment on reaching the destination saying that it was their *duty* to help fellow travellers, and sppecially those like us who were on a mission.

But the adventures of the day were not yet over. Nandakhal turned out to be another seventeen kms from Virar naka. Five people declared that they could not cycle any more and decided to call it a day right there, while the rest of us proceeded further. It was ten at night and this area it seems is not

not considered very safe, due to the acivities of smuggler gangs. Five miles down the road, we came upon a road-block and found to ur joy, a jeep there belonging to our hosts—the Harit Vasal group. One friend Joined us to show us the way, while the jeep went to Virarnaka to collect all those sleeping there and bring them to Nandakhal. By the time all of us reached our destination and ate the much awaited meal, it was past midnight.

The day had certainly toughened us. Later on, once we had to cycle 93 kms in a day over hilly roads, but that felt like child's play. But what really touched us was the unstinted help of those unknown Sardarjis and the wonderful hospitality of the Harit Vasai group. It was such experiences which are the most cherished memories of the yatra.

## Himalayan Blunder

The biggest blunder of the yatra was of our own doing. We had given very short notice of the whole programme and that had given very little time to local organisers to make arrangements. Thus, there was an air of uncertainty regarding the route of the yatra right till our departure since we did not receive any word from the people who were to be our hosts. Despite the short notice, the arrangements for our stay and the food almost everywhere were excellent. This fact bears testimony to the magnificent effort put up by our local hosts.

Only once did we have to fend for ourselves. This happened in Sindhudurg district. According to our schedule we were supposed to have a night-halt at a place named Meethbav, where the Sarpanch had been informed of our impending arrival. Meethbav was ten kms off our track. When Uma and Suren Raut who were the advance party on a motorcycle arrived there they found that there were no arrangements for our stay. The Sarpanch had considered his duty just lay in writings notice regarding a meeting in the town square, and he said that the village had no facilities for accomodating fifteen persons. At that, Uma and Suren hurried back to stop the rest before the detour. In passing, Uma noticed a Mahadev temple at a village named Dahibav. She went in and asked the old pujari there if the whole party could put up there for the night. Without a moment's hesitation and without even asking for the total number, he answered, "Of course." And he further added, "Would you be able to cook for yourselves if I get you food and utensils?" But as we were eating we found that he had another unexpected surprise in store for us. A lot of the young men of the village gathered at the temple. So after dinner we had a slide show and a fine lively meeting as well.

## Picture of Devastation

Talking to the villagers in Dahibav we found that this village was indeed exceptional—it did not have water problem whereas all the other villages in the vicinity were suffering from a severe water crisis. Even in my own ancestral home in Vengurla, which I visited for the second time in my life after a gap of thirty-two years, wells had run dry. All along the Konkan coast the sight of women walking large distances up hill and down dale to fetch a pail of water has become distressingly common. This, in an area which registers over hundred inches of rainfall every year, is an absolutely shocking state of affairs.

In fact, the whole cycle yatra was an object lesson in the after effects of this madness known as development. Hill sides in Konkan lay barren with hill tops presenting a desert like appearance. But deforestation and water shortages are not the only problems affecting the region. Industrial pollution and toxic waste dumping in water ways has made some rivers stagnant looking, foul smelling stench pools. The condition of Kolak river on the border of Gujarat with Daman is too appaling for words. Industrial pollution from Vapi has made this once rich fish breeding ground into a totally lifeless stream of some dirty viscous fluid. The villagers of Kolak came ten kms to meet us and to tell us about their plight. A lot of local fisherwomen have fallen ill with cancer of the pelvis, they claimed. Patalganga was another seriously contaminated stream. The culprit in this case was a chemical plant belonging to Reliance Industries. But all along the northern part of the route there were many operating and proposed agro-chemical complexes. The southern part of the route has a multiplicity of nuclear installations!

We had some very good meetings with people in villages which have been targeted as sites for chemical complexes. Everywhere one question dominated. How can we organize ourselves effectively to stop this monster coming in our area?

The dominant impression left on my mind from the yutra is one where the bull-dozer of development in riding roughshod over the picture-book pretty landscape. This impression is probably heightened because there wore a row of bulldozers and trucks all systematically tearing apart a hillside for the Konkan Railway project. Even this project, which could easily be implemented after consultation with the effected people and with their consent is sought to be implemented in a way where a large number of Christians in Goa feel that the railway is a disguised attempt to destroy their faith by destroying old churches and monuments.

## A Tale of Two Cities

I will never forget the public meeting in Ratnagiri-the home of Bal Gangndhar Tilak and many other leaders of the freedom struggle. Our local organiser had booked a hall and made announcements in all the local papers. We went to the hall a little ahead of time and waited for the audience to come. We waited and waited. Not a soul appeared. Finally, after nearly an hour, a man came. We all almost jumped on him hoping to 'convert' at least one person. But he had just come to inform us to vacate the premises since they were needed for another programme. We left. Just outside the hall, a little distance away was the main bus station. Aradhana started talking on the megaphone and soon there was a crowd of two hundred listening and asking questions and buying our literature. We did six such separate meetings in the course of the next two hours, and learnt a valuable lesson in the bargain. The energy spent in arranging public meetings with its microphones and chairs and tables and flowerpots is better spent doing street actions which are watched by far more and where there is more active participation.

But on the other hand, the public meeting in Bombaywas a very lively affair with a lot of people asking questions, expressing opinions and making promises of future involvement. The limitation of the street meeting is that there is no possibility of follow-up. And that is a very severe limitation indeed and a well arranged meeting like the one in Bombay is a reminder of this. The credit for the success of the Bombay meeting goes mainly to Mona Patrao and other members of the Anumukti Support Group which had been formed with a view to coordinating the Bombay programme of the cycle yatra.

## A Kaliedoscope of Changing Patterns

Every state boundary meant a new set of friends and a new pattern of organisation which was absolutely fascinating to watch. Different state groups had reacted to the possibilities presented by the yatra in different ways. Thus, for example, the Karnataka group had decided to utilize the yatra as an attempt to revitalize the Kaiga movement. In their preparation, some activists went and visited each and every village that they had previously contacted during the Save the Western Ghats March. Bailancho Saad in Goa, on the other hand decided to involve a lot of new groups and individuals who had previously been unexposed to antinuclear ideas. The Kerala activists on their part had focussed their efforts on people's participation and the huge crowds that greeted the yatra in Kerala were a tribute to their organizing skills.

Our hosts and supporters reflected the great cultural, religous and even ideological diversity of our country. Thus from R.S.S. and Shiv Sena to Gandhians, Socialists, Communists and Naxalites all hosted us and joined us. Rich chicu and supari planters took us in their homes, but then so also did many poor families. We stayed in Hindu mutts but then we also stayed in Christian churches.

But the real success of the yatra would depend mainly on how this upsurge in feeling can be channeled into a movement of continuing activity. On our part, we intend to organise both local level and all India level antinuclear camps at Vedchhi, during the coming year.

The finest tribute to the spirit of the cycle yatra came in Bhatkal. We had done a street play and talked and most of us had already left for our next destination. Dr Kusuma had stayed behind showing the Rawatbhata slides. A beggar woman with a mentally handicapped child who was watching the slide-show went around and collected a few Rupees and handed over this money saying, "you are working so that no mother in the world has to suffer like I have had to suffer." The antinuclear movement in India cannot afford to fail her.

*Surendra Gadekar*

## An Advertisement

Sampoorna Kranti Vidyalaya invites applications from young men and women to a new course, beginning from August 24, 1992. Applications can be obtained by sending a self addressed stamped envelop to:

Long Term Course
Sampoorna Kranti Vidyalaya
Vedchhi via Valod
District Surat 394641

The vidyalaya has facilities and funds to train around fifteen students during the next year. There is no fixed curriculum, but each student devises his/her own curriculum in consultation with the staff. Anybody satisfying the following four conditions can become p. student of the vidyalaya:

- He/she must come of his/her own choice and not be sent unwillingly
- Should have faith in non-violence
- Should be willing to do manual work. All work in the vidyalaya is done by the staff and students together.
- A minimal knowledge of Hindi and failing that at least a willingness to learn the language which is the language of communication in the vidyalaya.

The vidyalaya bears all the lodging and boarding expenses of the students during their stay. It does not bear travelling expenses incurred in travelling to and from the vidyalaya.

The long term course attempts to not only impart information and skills but most importantly it tries to develop attitudes so that the trainees can become agents of a non-violent, non-exploitative society. A lot of remarkable people, who are actively engaged in movements for an alternative society, and in peace and justice issues, visit the vidyalaya, and students get ample opportunity to learn from them. But the greatest asset the vidyalaya possesses is that it considers life itself as the best teacher and thus all experiences in community living are seen and utilised as learning opportunities.

# Human Right to Radiation Security

In 1948, when the Universal declaration of Human Rights was adopted by the UN General Assembly, nobody in the world was fully aware how radiation was dangerous to human beings. Today, having experienced the Chernobyl catastrophe, all people of good will realize the danger of radiation. It creates a threat to the very existence of mankind, human health and gene funds. The earth has already got 15 wounds caused by radiation, that cannot be healed, Chernobyl being the most terrible among them. The victims of these tragic events have been and are common peaceful people. Social efforts to reduce the damage caused by radiation are uncoordinated and weak. The efforts put forth by states and governments are also inadequate. International Atomic Energy Agency (IAEA), the sole international organisation dealing with atomic energy, concentrates its activities on control over military projects and maintaining the minimum safety standards for the workers of atomic energy industries. IAEA objectively cannot protect the interests of the people who are suffering, and in fact, it does not. Therefore, we have nothing at all to protect ourselves from the menace of radiation. This situation is getting worse due to some more factors. One of them is psychological. Since human sense organs cannot detect radiation, people do not realize its danger. The second factor is the profit-oriented attitudes of individual governments, industrial companies, and ruling class. They would keep the danger of radiation secret from the prople or sacrifice the counter-radiation measures by distorting and underestimating the facts in order to derive dubious advantage from accelerated technological progress. Another highly important factor is the inadequate concern for this global problem on the part of politicians, diplomats, and the world public. Meanwhile there is urgent necessity to take measures which could comprise a special comprehensive programme and support the human right to radiation security. As a concrete step to be taken initially we propose the following actions to the United Nations, the UN Refugees Committee and other international organizations:

- (1) To introduce the new concept of the "Status of Radiation Refugees" into international law, which is similar to the existing "Status of Refugees."

- (2) To establish the "Radiation Refugees Assistance Committee" attached to the UNO.

- (3) The assistance of the above mentioned committee must be given to all the refugees that either have already left their country or the contaminated area or have the intention to leave but no possibility to do so.

- (4) To supplement the Universal Declaration of Human Rights with an article which would provide for the right of all people on the earth to radiation security.

- (5)By amending certain articles (e.g.Art.3) in the Universal Declaration of Human Rights, to widen the spectrum of rights to ecological security, radiation security in particular.

- (6) To evaluate the level of radiation and take comprehensive measures according to fair scientific approach, not tending to the promotion of atomic power, in order to protect the people from the effects of radiation.

- **(7) Taking into account the** importance of the problem, a special session should be called by the General Assembly at which environment protection NGOs could be invited to present their opinions, as well as the representatives of member states.

We realize the possibility of different views concerning our proposals. However, we firmly believe that we must decide the fate of radiation refugees without further delay. It is a crime against mankind to bring about another Chernobyl.

*Vladimir Kirichansky*
*Secretary for Zhitomir regional organization of Journalists League of Ukraine*

*Valery Nechiporenko*
*Editor, Zhitomiraky Visnyk*

*Hiromi Bando*
*Chernobyl-Chubu Relief Assoc.*
*Nagoya, Japan*

# An Unprecedented Disaster

## The Government's Own Case Against Kaiga

**1988** turned out to be a Watershed year in the history of nuclear activities in India. In December of that year, the Government of Karnataka, besieged *as* it was by public uproar regarding the installation of an atomic power plant at Kaiga, in the heart of the Western Ghats, organised a public debate between the authorities of Department of Atomic Energy (DAE) and the members of the protesting public. Probably for the first time in the history of such movements, environmental groups got an opportunity to debate astablishment scientists in an open forum. Represented by eminent technologists, scientists, economists and ecologists, they displayed a rare degree of sophistication and expertise in matters nuclear. The DAE could no longer brand the environmentalists as woolly headed do-gooders. In a desperate bid *to* defend itself the DAE parted with a considerable though not adequate amount of information concerning the Kaiga project. DAE did deposit some documents at the library of the Indian Institute of Science, Bangalore and shortly thereafter made some of these documents available to us through the Supreme Court where a case against the installation of the Kaiga plant is presently pending. The most important amongst the documents made available this way are the M.R.Srinivosan committee report on site selection (SSR) and the Rapid Environmental Impact Analysis (REIA) report prepared by the National Environmental Engineering Research Institute (NEERI) for the extension proposal at Kaiga. The DAE has not yet given us the Environmental Impact Assessment report for the original Kaiga project.

Even a cursory reading of these reports reveals that Kaiga site is most unsuitable for the installation of a nuclear power plant even by the government's own siting standards. The installation of a nuclear power plant at Kaiga is unprecedented for a number of reasons.

It is for the first time that a nuclear plant is being located in the heart of the dwindling rain forest. Tropical rain forests are a rare ecological niche and ought to be considered as a collective heritage of the people of India. No effort has been made to gather even elementary base-line data of the precious flora and fauna of the area which is home to many near-extinct species.

It is also the first time that a nuclear power pant is being located in close proximity to a cluster of eleven (existing or proposed) dams, in an area of proven reservoir induced seismicity. The risk due to dam failure here, (especially the Supa dam,) to the power plant is not negligible. Also here the existing water ways could maximize damage due to any accidental radioactive release to the environment.

## Site Selection Committee Report

The available literature from the government's own sources justifies these fears amply and throws light on the mechanism by which the government works on these matters. Going into the details of site selection committee report, one finds that making a comparitive ment of the various sites, the committee made the following observation:

- In respect of storage of solid radioactive waste, rocky substrata and low water table are desirable for safe burial and containment of waste. But in the Kaiga area, the report notes that the water table is above ground level in the high water table season. This is evident to anyone who has cared to visit tis area in the monsoons.

- For rapid dispersal of radioactive waste, it is desirable that good wind speeds be associated with the topography. But the report notes that at Kaiga, the topograghy is predomiantly hilly, somewhat close to a large bowl with a valley providing the opening. The calms are also reported to be high.

- In respect of access and transportation facilities, the report notes that broad guage rail heads are far away at Mangalore and Hospet at distances of 330 and 355 kms respectively. All other sites, Tungabhadra, Kudankulam, Bhoothathankettu, Nagarjunasagar and Kalpakkam have better transportation facilities. Even regarding ocean transport, Karwar does not have the requisite draft for receiving big ships for construction work. The report clearly states that "there are no existing facilities and infrastructure at Kaiga which can be made use of during construction."

Clearly, the Kaiga site is endowed with the poorest communication and transport facilities of all the proposed sites. This issue is neither unimportant nor peripheral as may seem at the outset, especially in light of the fact that the Rama Rao committee has identified poor transport facilities as the main reason for the failure of the Rajasthan Atomic Power Station, Rawatbhata to perform satisfactorily.

In respect of foundation conditions and the seismic environment, a prospective site must be endowed with good bed-rock conditions, but the Site Selection Committee has done only limited bore hole investigation and provides no data about these.

## Rapid Environmental Impact Analysis Report

However REIA has a lot to say about the bed rock and seismic conditions. It states that "the whole area has undergone extensive laterisation and among the 17 bore holes dug for geological investigations, core recovery has been poor to very poor." The report further states that:

- There are major geological faults in the region between Haliyal and Sirsi. The Kaiga site straddles a confluence of three major faults which makes the site "vulnerable ". The Kaiga site is in a parallelogram whose south-western angle was the epicentre of the earthquake triggered by the Koyna dam reservoir.

- The course of the Kali Nadi river runs parallel to lineament No. 11 and (his is a source of major concern as seven dams of the size of Kadra Dam have been planned in the the area.

The 1967 Koyna earthquake was triggered by impounding of water and the reservoirs which have been planned will go a long way in lubricating faults, fissures, joints and fracturess, both major and minor and make the site unsafe from a seismological point of view. Lineament No. 11 is specially active and the Kali rive runs parallel to it. The Kaiga site and it's water resources are intimately connected with it. It is thus clear that from a geological point of view, Kaiga does not satisfy the basic criteria required of a site for an atomic power plant.

Apart from these, there are a number of other factors that have been overlooked. The report admits that investigations of the micrometereology of the Kaiga site are inadequate and incomplete and the effect of evaporating 300 million litres of water per day on the temperature, humidity and aquatic life has not been investigated. These effects are unlikely to be benign on the sensitive environment of the rain forests. The REIA makes no mention of the release of tritium, a radioactive isotope of hydrogen in the form of tritiated water.

In the matter of rudioactive waste disposal, NEERI has no independent expertise and has left this whole mutter to the Nuclear Power Corporation itself. No evaluation of the management of wate transport, location of waste storage sites, and waste transportation routes has been done in the report. Base line health data have not been collected but a cursory mention of the prevalence of cervical cancer among the females of the Gowda community has been made. But there is no epidemeological 6tudy to quantify this observation or identify the causes.

However, a socio-economic survey has been carried out which points out that half the surveyed population is opposed to the project and among the rest who support it, about half do so because of the promise of jobs held out to them by the NPC personnel. Terming the opinion held by the people opposing the project as "wrong ", the REIA recommends that the NPC personnel must carry out a "campaign " to correct this. One wonders if such suggestions from NEERI are a part of the terms of reference!

## Why Kaiga?

If the Kaiga site is unsuitable on ecological, geological, geographical and strategic considerations, why then is the government going ahead with the Kaiga project even when a majority of the local populace is opposed to it?

The answer can be found in the site selection report. The committee admits that not all factors influencing site selection are objective and quantifiable and a certain subjectivity invariably arises while making a comparitive evaluation of several sites. This I believe is one of the most candid admissions to be made by out technocrats because all those years they had steeled themselves within the fortress of "objectivity " and technical expertise and flung the epithets of "subjectivity " at environmentalists

Mow has the site selection committee resolved this dilemma of objective facts that disqualify Kaiga and the subjective compulsions of installing a plant there? The report answers the question by suiting that only "techno-economic " criteria wort[4] relied upon in recommending Kaiga as a suitable site. In fact, the Chairman of the Atomic Energy Regulatory Board, in a fit of honesty admitted during the December '88 donate, that Kaiga was a political decision.

This brings us to the central issue at hand. Can the welfare of the people and their democratic will, be sacrificed at the altar of political expediency?

A quick review of the reports of the three previous site selection committees, reveals that Kaiga was never even mentioned by the Hayath (1962), Vengurlekar (1975) and Kati (1982) committees. Whileevery other site such as Kalpakkam, Kudankulam, Tungabhadra and Nagarjunasagar have a history of being favourably considered by successive site selection committees, Kaiga does not find a mention in any of the earlier reports. Even more intriguing is the fate of the Kati committee report which was submitted as late as October 1982 and which does not recommend Kaiga. One fails to understand why the Srinivasan committee was constituted in September 1983 barely an year after the Kati committee submitted its report. None of the siting criteria could have changed in an year's time and yet we have Srinivasan committee (which relied heavily on the data compiled by the Kati committee), coming out with a new list of suitable sites. Kaiga came from nowhere to the top of this list!

## A Mammoth Project

Unlike others, the Kaiga project is a mammoth project, the dimensions of which only a few have realised. The Kaiga Atomic Power Plant is contingent upon the successful completion of the Kadra Dam, which itself has overrun its time schedule by over three years and is still not even half complete. Kaiga is viable only if the Kadra reservoir receives the requisite quantity of water after which a 8 kms long channel has to be constructed for the outflow and inflow of water to the atomic power plant. Meanwhile the Kaiga project can be completed only when the Karwar port is developed sufficiently to be able to berth ships of the requisite tonnage that can bring in the heavy equipment to be erected there. Simultaneously the forests are being surveyed for the laying of heavy tension lines to energize the reactor as well as to evacuate power over enormous distances. Each of these projects by themselves can be daunting and the success at Kaiga is dependent on the simultaneous success of all of these. While the psychological predilections of being a developing country compel us to take on such mammoth tasks to "prove" to the world our technological power, can we really afford to commit our meagre resources to such empty challenges?

*Dr P Vishnu Kamath*
*Dept, of Chemistry,*
*Central College*
*Bangalore University*
*Bangalore 660001*

# Can Conservation Replace Kaiga?

Everyone 'knows' that energy conservation is the first alternative to nuclear power. However, there is a general misconception that conservation simply means using less electricity — that it implies a primitive lifestyle that foresakes the modern comforts offered by electricity. While an austere lifestyle may be intrinsically desirable, it is not the only alternative. In this article we devote ourselves to examining the possibilities of obtaining basic needs and comforts by using minimum amount of electricity required for the job.

Take lighting for example. No environmentalist would argue that we should not use electricity for lighting. But what we can and should be doing, is to get down to basics and ask whether it optimizes the ratio of light generated to electricity consumed. The answer is an emphatic NO in case of incandescent bulbs. In a bulb, a tungsten filament is heated to a very high temperature, where the glow is sufficient to perform the lighting. The electricity here is used basically to generate heat, not light. The light comes as a by-product. On the other hand a flouroscent lamp, or a tubelight as it is generally known, uses a different technology to generate light in a more direct fashion. Using a tubelight amounts to a better, more efficient utilisation of electricity.

This much is common knowledge. Our electricity boards often advertise, exhorting people to use tubelights and save energy. But the higher initial cost of tubelights has inhibited their widespread use. Should not the government then subsidise the tubelights to promote their use? Should it, for example, divert the funds from our atomic energy projects towards subsidizing the tubelight industry? The answer would be yes, provided it made economic sense. That is, if one could save more electricity more cheaply by using a large number of tubelights than by constructing and operating a nuclear power plant.

Just how many tubelights are required to replace a reactor?

Let us first calculate the energy generated by a nuclear power plant. A typical plant of 235 MW operating for 25 years continuously, would generate

235 x 1000 x 365 x 24 = 51465 million units of electricity

For the uninitiated, one 'unit' of electricity is generated when a plant of 1 kilowatt capacity works for one hour. Above we have converted 235 megawatts into kilowatts and multiplied that by the number of hours in a year. However, none of our reactors work anywhere near their installed capacity! The average for the nuclear power plants operating in the country is just 43%. Even if we assume a 50% plant load factor, the units generated come to 51,465 X 0.5 = 25732.5 million units. But not all the energy generated is available for use. India has an astonishing and shamefully high figure of 23% for transmission and distribution losses. Even if we make a saving of 2% in this, we could do without nuclear power, but that is not the point of this article.

In other words, only 77% of the electricity generated is available for public use. Thus, we have 25,732 X 0.77 = 19,814 million units available for public use.

How many tubelights are needed to save these many units of electricity? The latest compact flourescent tubes consume no more than 20 watts of power but give the same amount of light as a hundred watt incandescent bulb. Further, the typical life of these new tubes is 10,000 hours. The compact tubes work over a wide AC input range unlike the standard tubelights presently available on the market. If we replace one 100 watt bulb with a compact tube, it will save us 80 watts X 10,000 hours = 800 units of electricity. Therefore, to save 20,000 million units we need 20,000 million / 800 = 25 million tubelights Now, the question that comes is how much is all this going to cost. Nuclear reactors, by the governments own admission, cost well more than Rs. 1,000 crores. The open market price of the compact tubes is about Rs 200. But this includes the profit margins of the manufacturer and the dealer and also the marketing and distribution costs. If the government were to set up a plant for manufacturing the tubes, the price would come down substancially, particularly when one considers the economies of scale involved in producing two and a half crore tubelights! However, even at the present inflated market rates the cost of these two and a half crore tubelights works out to be just Rs.600 crores, just half that of a reactor.

Instead of setting up a reactor, all that the government has to do is to manufacture compact tubes in large quantities and distribute them absolutely free of charge to the public. All public illumination and lighting of official buildings can be changed over to the more efficient technology. The public will certainly respond enthusiastically since they will get the same or better illumination at 20% of the electricity bill. The new tubes can be engineered so as to fit into the existing lamp-holders, so the changeover will not require any additional effort. The reactor can be scrapped.

A few comments and clarifications are in order. The Rs 1,000 crore figure is only the admitted cost of the reactor. The true cost of nuclear power can be mind boggling and hence the tax paying public is kindly spared this distressing bit of knowledge The cost of decommissioning and waste disposal are not included by our nucleocrats in their calculations. Decommissioning is not acknowledged as a problem and waste management is swept under the carpet of reprocessing, vitrification and fast breeder reactors. However, the cost of these is enormous and has to be paid for by future generations.

The 50% plant load factor is also highly optimistic. None of our reactors have shown any promise of working for 25 years and still end up with a gross figure of 50% at the end of it, as assumed in the calculations. CANDU reactors are known to age fast, and are likely to need scrapping after less than twenty years only. Prolonging their life will require massive overhauling exercises involving heavy additional cost, as the Canadian experience demonstrates. Despite the most unfavourable and conservative estimates, the above calculations show that energy efficiency in lighting applications alone can save as much electicity as can be expected from a nuclear reactor at half the cost. The scheme is environment friendly, will have full public support, has low gestation period and can be decentralised easily. And yet it will not be taken up seriously as an alternative to atomic energy because of just one shortcoming!

Compact flourescent tubes do not produce any plutonium.

*Sanjay Havanur*
*Citizens for Alternatives to Nuclear Energy*
*Bangalore*

## A Warning

Radioactive wastes from nuclear reactors are being introduced into compact tubelight fixtures as materials in glow starters and these are being sold in India. These have been and are being discarded in the West. Compact fluorescent tubes (CFT) with non-radioactive materials are available. These give the same light as a 60 watt incandescent bulb but consume only 11 watts. These CFTs use electronic circuits and avoid radioactive starters. The claimed efficiency is more than four times that of conventional tubelights. However, an enquiry from India importers revealed no information on the energy audit of CFTs. The energy investment including that used in the production of materials used in the construction of CFTs and its accessories is essential to estimate the net life-time energy saving resulting from the new device. CFTs cost a great deal more than an incandescent bulb. The cost of a tubelight using radioactive material should really include the overheads introduced from the nuclear enterprise from which the radioactive material emerged as waste in the first place. Just because someone like a weapon's manufacturer has free access to these wastes does not bring down the real cost of a commercialised product using such wastes. Krypton-85 used in these glow starters is a deadly radioactive gas emitting gamma rays which can travel long distances and each ray has an energy of 517 kilo-electron-volts. Just one such ray would traverse some 70 cells and injure them all in microseconds. The repair of cells takes a much longer time (4.3 billion times more than the microsecond it took to cause the damage and then all the cells are not fully repaired.) The power of such energy transfer is of the order of 2500 watts to these cells. We must compare this to the power produced by the whole human body of some 170 watts! Thus, a gamma ray hit results in a strain to the affected 70 cells of about 15 times the whole body normal work. The corresponding shock delivered is something like 250,000 volts when the ray ionises a cell to eject an electron out of the cell. And there will be tens of thousands of ioni3ations inflicted **on** the cells by each such gamma ray. And this is the lowest possible dose from the radioactive source. That is why there is universal agreement that htere is no safe level of radiation and this one ray can cause cancer or depression of the immune system. Thus, when we can avoid unnecessary exposure to radioactivity we must avoid it and ensure that standards of health and well-being are not unnecessarily compromised.

R.Ashok Kumar
Bombay Sarvodaya Mandal
299 Tardeo Road, Nana Chowk
Bombay 400007

# Rawatbhata Health Study-Some Preliminary Results.

**O**riginally we had expected to publish a detailed analysis of the study on the health of the people near the Rawatbhata Atomic Power Plant (RAPS), in this issue. Unfortunately, the work of data entrty into the computer has taken much longer than our expectations. Therefore, a detailed analysis would have to wait. However we are puublishing this preliminary report since the plant authorities in Rawatbhata have started claiming that we did not find any effects at all and hence our silence. However we do hope to publish the full report within a month or so.

## Survey Methodology

We wanted to find out definitive answers to two basic questions.

- 1. Has the operation of the nuclear power plant resulted in any adverse effects on the health of the people living in the vicinity?
- 2. Has this massive development project made the poor less poorer?

To this end, we decided to select 5 villages in the vicinity (less than 10 Kms.) of the plant, in the East-Northeast direction and compared them with a group of villages around 50 Kms distant from the plant. For greater details of why particular villages were selected, please refer to the article, A report on the Rawatbhata Health Survey in October/November 1991 issue of *Anumukti*.

The other point that was decided was to obtain information from each and every household in the selected vilages, and not rely on a random sample. This was done to avoid any possibility of bias in the selection of the sample. Of course, despite our best efforts, a few houses have been inadvertantly left out since the respondents were not to be found at home despite repeated visits. However, the number of such "missed" households is less than 2 percent and would make no difference to our conclusions.

All the people who complained of any serious symptoms were examined by doctors and the statistics are based on their diagnosis.

## Conclusions

Till now, we have only analysed questions in the survey schedules which pertain to the health aspects, and there is no doubt at all that the health of the people in the nearby villages is much worse than that of people in the distant villages. The health picture ofthe two areas presents some telling contrasts.

- 1. Whenever a comparison is made of symptoms like short duration fever, weakness, breathlessness, cough etc. one finds there is no significant difference between the two populations.
- 2. Similarly diseases such as diabetes, heart conditions, hemiplagia (one sided paralysis), etc. there is no difference between proximate and distant villages.
- 3. Diseases of the skin, digestive tract, sex organs, chronic and crippling infections all show a significant increase in the nearby villages. Specifically four times as many people suffer from skin problems, three times as many from digestive problems and three times as many from sexual disorders.
- 4. However, the most startling contrasts appear in the comparison of solid tumours and congenital deformities. More than ten times as many people have different kinds of tumours in the nearby villages. Similarly the proportion of congenitally deformed persons is four and a half times higher in villages near Rawatbhata.

A point which needs to be noted strongly is that the health effects are far more significant and pronounced if one considers only young people of both areas. Thus, people who have been born after the reactors have started operating show far more deterioration in their health status than older people.

Questions besides those dealing with health have not as yet been considered in the analysis. So, right now we are abstaining from attempting to answer the second question in the previous section. However, information to give an unambiguous answer to this question has been obtained and we hope to do so shortly.

*Surendra Gadekar*

## LETTERBOX

Recently I had an occasion to go to Rawatbhata. Right now the government is engaged in a strong propaganda effort. Even a short term course on radiation biology at Jaipur was full of one sided statements favouring atomic energy and denying any radiation effects. Employees of Rajasthan Atomic Power Station were among the speakers. They are trying to create an impression that the survey that you conducted around Rawatbhata did not find any adverse health effects and that is why the results have not yet been published. Therefore, the quicker the results of the survey are published, the better.

*Dr Rampratap Gupta*
*Government College*
*Rampura M.P. 458118*

Anumukti is a wonderful journal and has been very useful to our cause. Since I first wrote to you (see *Anumukti* Vol.5 No.l) The Yankee Utility has decided to close forever its Rowe reactor. While we are all ecstatic about this, we still have much work to do. We are planning to continue with a comprehensive health study of this region. We are also continuing our research on such things as high and low level waste, emergency planning and evacuation, and the economics and politics of atomic power, etc. In addition to continuing our local grassroots organizing Citizen's Awareness Network (CAN) is seeking funds from various foundations to assemble an organising packet (based on our successful campaign against Yankee Rowe) to distribute and give assistance to other organisations around reactors. In the tiny region of New England alone, there exist seven other nuclear power plants, six of which are at least twenty years old and are beginning to show dangerous signs of aging.

CAN has also arranged meetings with two different delegations of grassroots organisers from Japan. We have also had correspondence from a group in Mexico and with two from Canada. The last delegation from Japan petitioned the United Nations to include in its "Refugees" category, a definition for "Radiation Refugees". (See Radiation Refugees page 7). CAN is in the process of drafting a similar petition. With all this international correspondence and exchange of information and ideas, 1 am feeling that an international, grassroots organizing forum or conference is needed. We are all doing such good hard work. I believe that if we band together in solidarity and combine our knowledge and skills then we will be well on the way to preserving our planet. We are all nuclear refugees.

*Ms Gail Steinbring*
*Citizens Awareness Network*
*P.O.Box 83 Shelburne Falls,*
*MA 01370*
*U.S.A.*

Your cycle yatra must be proceeding smoothly. I am sorry that 1 missed your programme in Bombay. There was very good coverage in the Bombay papers about the yatra. I had gone on a padayatra to Dandi in 1980, and therefore I have some idea of the kind cf experiences that you must bo having in your trip. Of course, since we were walking, communication was even more poor and anyway during the last twelve years communication network and telephones etc. have become ten times better, and so the feeling of being cut-off from the world is not so strong, but even then one eagerly awaits any letters that might be waiting at the next contact address and that is why I am writing this letter to you.

Usually, if one is travelling for a cause, one tends to be extremely busy and overworked — late nights etc. For cyclists the best time to travel is early morning if you can force your hosts to let you go at 5 AM. You must be careful of the eating habits of all the members of the team. Many do not feel any apetite, but they are actually quite hungry. But since you have earlier experience of cycle yatras, so you know most of those things quite well.

You would be meeting hundreds of people at a personal level, (and that makes me jealous!). Antinuclear issues apart, there are a lot of other related matters which need to bo discussed and could bo talked directly to the people. Many people are more receptive to new ideas from a travelling group interacting on a personal level.

In the light of recent economic and commerce policy we are not only endorsing the Western model of development, but we seem to be endorsing Western definition of happiness! This model is totally energy intensive. Do we not need to fight this basic tenet? In the West, the per capita energy spent is considered to be the index of development. If we accept that, then where we derive our energy from becomes a matter of secondary importance at best. It is not the government alone which determines energy policy. People are also responsible for the choice. I feel that the yatra type of contact is effective in making people think about themselves and their choice of lifestyle and in which way they can contribute towards changes. Please avail of this opportunity to raise these important issues.

*Paresh Vaidya*
*AFD, BARC, Bombay 400085*

While BARC officials like Mr V.V.S.Mani on the one hand, write that long lived radionuclides area long term hazard and need to be isolated from the biosphere, *(Nuclear India),* on the other hand BARC is freely permitting the use of ionisation smoke detectors with radioactive material inside them for ever in contact with the environment. The radioactive material inside the detector is Americium 241 which decays to Neptunium 237- which has a half life of 2.2 million years! The proliferation of these radioactive smoke detectors in industrial and office establishments all over the country poses a serious risk to the blue and white collar workers and managers who are committing suicide in a state of blissful ignorance. Krishna! please come quickly and show the world Anumukti.

*R.Ashok Kumar*
*Bombay*

In your February-March 1992 issue, on page 6 under the subheading "India's Record of Democracy", the following sentence appears: "Free movement is not possible in a quarter of India's territory, because there are just too many armed men out there! This may be so in the North and North West on the borders of Kashmir and Punjab and also perhaps in the territory north of Cutch and Rajasthan, as these ore areas from which illegal immigration and militant terrorists sneak in to cause disturbances in India. But I wonder, if this would cover a quarter of India's territory. Besides, you appear to suggest that the absence of free movement is due to reasons other than those of national security and involves avoidable and unnecessary restrictions on the freedom of movement. I think these inferences would not be correct.

*R.K.Patil*
*Civil Lines, Nagpur*

Let me share with your readers two interesting things that I read in other (uncommon) journals. One is from an excellent interview with Vandana Shiva, the well known environmentalist, in the Unesco Courier of March 1992. In response to a question-regarding the her changing her profession from being a nuclear scientist to the present one, she says (I quote only the portion relevant to anti-nukes, though I recommend the whole article highly to all interested in environmental concerns);

"*... real, profound understanding of nature was supposed to be reached through physics. Then I went to nuclear physics, where I experienced massive disappointments. It was only when I was doing my master's degree that I realized how unthinking nuclear scientists were about the question of radiation hazards. We were taught how to create chain reaction in nuclear material and we knew all about energy transformations, and so on, but nothing about the interaction of radiation with living systems. I learned about radiation impacts from my sister who is a doctor. When I was working in a nuclear reactor in India, she kept saying: "Promise me you are never going to go back there!" "But why?", Id say and she would reply, "you could have babies with mutations. You don't know what's going to happen to you." "When I was groping my way and exploring these issues, senior physicists would say, 'You don't need to know these things," Again this was an exclusion and a violation of my search for knowledge. If science means to know, then I had no scientific training."*

No wonder our nuclear scientific community is so agitated and cannot accept when you tell them about Rawatbhata study or any other effects of radiation contamination. In fact, the MBBS syllabus itself has one and half a page on radiation.

The other niblet is from the Safe Food News of Food and Water Inc., quoting from *Atoms and Waste* of Feb.6,1992:

## State of the Art?

### Sledgehammers Used to Close Safety Valves

*Wisconsin Electric Power Company (WEPCO) routinely used an eight pound sledge hammer to close safety valves at its Point Beach plant The values - giant main steam isolation valves — are required to close within seconds under accident conditions to prevent radioactive gases from leaving the containment area. The Point Beach personnel interviewed by the Nuclear Regulatory Commission (NRC) reported that valve falilures "had become so routine that the use of operator assistance in closing these valves (with a sledgehammer) was considered an acceptable practice. WEPCO had been fined $160,000 for this and other safety violations."*

Doesn't that make our nuclear establishment quite equal to the American one? Only Atomic Energy Regulatory Board (AREB) wouldn't do any of what NRC has done. If they read this, they would perhaps, rest even more content.

The Feb/March issue of *Anumukti* is excellent. It has been more prompt in production than when you happened to be settled in your headquarters! Maybe, cycling increases your efficiency. I particularly liked two articles in it: *Principles of Ecology* — excellent, prompting good soul searching, expansive. The other one is V.T.Padmanabhan's critique of CSE's paper on -Earth Summit- adds a very vital dimension beyond the simplistic polarisations in CSE's paper.

I would suggest that you give an author by-line rather than ghost I's writing or giving it like a Letter to the Editor type. It could even improve the get-up, too. I believe that it is a journalistic principle that when opinions are expressed, authors should be revealed.

*K.Krupa*
*809,17E Main, 5th Block*
*Rajaji Nagar, Bangalore 560010*

**Report**

# National Antinuclear Convention at Peringome

Anumukti cycle yatra crossed the Karnataka-Kerala border on the 24th of April. The yatra started from Kasaragod early in the morning of the 25th and reached Payyanur in the evening.

All along the route people assembled on both sides of the road to welcome the yatra. Public meetings were held at various places like Manikkoth, Kanhangad, Nileswar, Cheruvathur, Kalikkadavu, Karivellur, Karamel and Annur in Kasargod and Kannur districts. Thousands of people gathered at Payyanur to welcome the Yatra. Eminent Gandhian activist and poet Sri A.V. Sreekanta Poduval presided over the large public meeting at Payyanur.

On 26th of April, Anumukti cycle yatra proceeded to Peringome - the site of the proposed nuclear power plant. The yatra was accompanied by numerous other cyclists from various places near Payyanur. Meetings were held at Kankol, Kundemkovval, Mathil and Aravanchal enroute. As the yatra reached Purakkat para, the actual site of the proposed reactor, a large gathering of men women and children, gave them a very warm and touching welcome with great emotional fervour and enthusiasm. The cyclists were garlanded to the accompaniment of beating drums and fireworks. The leaders of the yatra, Drs Sanghamitra and Kusuma were presented with white doves as a token of people's love for peace and concern for a non-nuclear world. Thousands of people watched as the doves flew into the skies of freedom. Everybody joined in and formed into a large procession which marched through the main street of Peringome in a massive demonstration against nuclearisation of India.

The valedictory meeting was held at the end of the demonstration. The whole gathering stood up in silence for a minute to pay homage to the victims of the Chernobyl disaster. Prof.R.V.G.Menon, Dr Surendra Gadekar and Dr .Kusuma spoke on the occasion. Prof Menon exposed the untruths being propagated by the nuclear establishment and contended that Kerala needed no nuclear plant to satisfy either its present or its future needs. Dr Gadekar stated that Chernobyl had exploded the myth of the safety of nuclear power. Dr Kusuma emphasised that women had an important role to play in the antinuclear movement and exhorted the women of Peringome to join the ongoing fight to prevent a nuclear plant coming in. The meeting ended with a slide show by Dr Sanghamitra about the health effects being observed in villages around the Rawatbhata nuclear power plant in Rajasthan. Dr Surendranath, the chairman of the Antinuclear Forum of Peringome who presided over the meeting thanked the cyclists from different parts of the country for coming over to Peringome and expressing solidarity with its people.

On 27th morning, there was a session presided over by Surendra Gadekar on "Conservation and Alternative Sources of Energy" Speakers included Prof Menon, Ashok Kumar from Bombay and N.Swaminathan from Thrissur. The last session was for sharing of experiences of activists from different parts of the country and based on these experiences for consideration of future programmes. Dr Sanghamitra Gadekar chaired the session. Anton Gomez, N.Subramanium, Dr Kusuma and Dr Sanghamitra narrated the present state of the antinuclear struggles of Koodankulam, Peringome, Kaiga, Kakrapar and Rawatbhata respectively. After that the meeting was broken up into small groups to decide about future programmes and spokesperrsons from these groups later reported the conclusions to the plenary.

The following are some of the suggestions that came up during the discussions:

Common Ground

Issues need to be identified on which there is unanimous agreement among antinucler groups and individuals. For example, the need for scrapping the Atomic Energy Act of 1962; the need to study the health and environmental effects around nuclear installations; the need to press the government to issue a white paper on the nuclear programme; familiarise activists and people with alternative technologies; the need for better press coverage of antinuclear issues, etc.

Better Networking

*Anumukti* needs to become a better instrument of networking between various groups. Peringome Antinuclear Forum suggested that efforts should be made so that more people subscribe to *Anumukti* and each group should make it a point to write a letter every month to various groups and to *Anumukti.*

Coordination

There should be increased coordination between antinuclear groups and other like minded groups such as environmental groups, health groups, human rights groups, women's groups

Some groups felt the need for a central committee or a contact council at a national level. However, a decision on this was shelved since others felt that the convention was not fully representative of the various regions of the country. There was universal agreement on the need for organising more cycle yatras and other awareness raising people's contact activities. The Kakrapar group issued an invitation to others to hold the next national convention at Kakrapar.

The need to conduct more health surveys around nuclear installations as has been done in the case of Rawatbhata was emphasised. There was need to train people in conducting such surveys. The *Anumukti* group offered the facilities available at the Sampoorna Kranti Vidyalaya campus to conduct such workshops and training programmes.

The question of how to take a political stand was discussed at length. Also there were differing views expressed regarding the need for nonviolence in antinuclear protest. After summarising these suggestions in the plenary session, the meeting called upon the government to abolish the Atomic Energy Act of 1962 and to publish a White Paper on the working of Indian nuclear plants. It also requested the government to stop further nuclearisation of the country. The meeting also adopted another resolution condemning the police repression and high-handedness against the activists fighting for their rights in the Narmada Valley.

The meet ended on the evening of the 27th of April. All the activists felt more enthusiastic about future work. Most participants felt that the Peringome meet and Anumukti cycle yatra had instilled greater confidence in them.

*K.Ramachandran*
*Payyanur*

## Editor's Apology

It is already July and this is the April/May issue. I do not know what to say. I have apologised many times in the past but apologies however sincere can be no substitute for substance and I still don't manage to bring out Anumukti in time. In fact, we are falling behind schedule. The June/July issue, whenever it does appear and I hope that is within July, would still be late.

Shortage of material fit for the journal is not the problem. Actually, the opposite is true. The flow of news items on nuclear issues is something of a flood and one is liable to get drowned. Anumukti coulld be a monthly and still have enough 'matter'.

The bottleneck lies in the fact, that right now, Anumukti group consists of just three people, all of whom have other, sometimes more presssing, committments. For example, although I am the editor, I am first a farmer and the month of May, the time just before the rains, is the busiest time. Journals have deadlines but plants are dead if they do not receive tender loving care in time. And everybody being away for a month during April for the cycle yatra doesn't help at all. So if any of you can volunteer to come and stay some time in Vedchhi and become part of the Anumukti family, do not hesitate for a minute. Apply now. See Advertisement on page 6 of this issue.

The other point I need to apologise profusely is the fact that in the last issue, I missed giving credit to people whose articles appeared in the issue. Ms Krupa has rightly pulled me up for this lapse. I would see that at least this sort of sloppishness doesn't take place again.

*Anumukti deeply regrets the untimely death at the young age of 26, of the antinuclear activist N.Swaminathan of Altermedia of Thrissur, Kerala*

Subscription Rates:

Rs 25/- per year in South Asia
U.S. $ 15/- per year or equivalent in other foreign currencies for airmail overseas.
(Rs. 300/- if paid for in India)
Lifetime: Rs 250/- (only wiithin India)
Please add Rs. 6/- for cheques and outstation drafts. Drafts should be drawn on State Bank of India Valod. (0531)

Anumukti team: P.P.Baburaj, Sanghamitra Gadekar and Surendra Gadekar

Editor: Surendra Gadekar
Subscriptions, donations, manuscripts, enquiries regarding circulation should all be addressed to:

Editor Anumukti
Sampoorna Kranti Vidyalaya
Vedchhi via Valod
Dist: Surat 394641 INDIA

(Please do not send personal chheques in the name of S.Gadekar)
Published by S. Gadekar for Sampoorna Kranti Vidyalaya and printed by him at Parjjat Printery Ahemedabad.

**PRINTED MATTER** **BOOK POST**

ANUMUKTI

A Journal Devoted to Non-Nuclear India

Vol.5 No.6 June/July 1992

# Now is The Time to Resist Uranium Mining in Meghalaya

The Centre has allocated "sufficient funds" in the Eighth Plan for the setting up of a commercially viable uranium processingunit at Domiosiat, 140 km from Shillong. It has also asked the Meghalaya government to acquire the necessary land for further exploration and resolve the ongoing dispute with the district council authorities at the earliest.

Uranium was found at Domiosiat in 1989 after five years of exploration work. Samples were rushed to the Atomic Minerals Division for testing. In 1990, the division's report confirmed the presence of a rich vein of uranium. In August 1991, an official announcement of the 9,959 tonne deposit of $U_3O_8$ was made. This is the largest single uranium deposit in the country after Jaduguda in Bihar.

Immediately after the uranium reserve was found in Meghalaya's East Khasi Hills, the local tribal residents raised a strong protest against further exploration as they feared large-scale evacuation from the area and adjacent villages. The irate residents also chased scientists and other staff with bows and arrows.

The tribal district council also raised objection over the acquisition of land for exploration work. The central government, in a letter issued last month, asked the state government to sort out the problem with the district council authorities and acquire the land for setting up of a semi-processing unit. The Uranium Corporation of India Ltd (UCIL) has also been asked by the Centre to step in and commence commercial mining.

Meanwhile, former state minister, Hoppingstone Lyngdoh led Hill People's Union joined the agitating local residents and is now trying to mobilise mass opinion against further exploration and setting up of any mining and milling unit.

Another major irritant is the Khasi Student's Union, which has recently stated that the Centre can begin exploration work only if it agrees to give 50 percent value of the mined uranium as royalty. The government has yet to react to this proposal.

However, two prominent Khasi leaders of the state — Prof.G.G.Swell and former Chief Minister B.B.Lyngdoh — have responded positively to the Centre's plan to begin exploitation as "Uranium is national property."

The two leaders have asked the Centre to ensure proper rehabilitation of the evacuated tribals. The ruling state Congress Government has also made it clear that it would take all measures to rehabilitate local residents, if required.

The local protest over the uranium deposit is remeniscent of that over the linking of the state by rail. The government's efforts to put Meghalaya on the country's rail map failed as local tribals resisted the move fearing "massive Invasion of plainlanders." They pointed out that natural resources and coal would be taken away from the state thereby "exploiting" the local residents.

However, sources in Meghalaya rule out any such protest this time against setting up of the proposed uranium unit.

*Sujit Kumar Chakraborty*
*The Observer of Business and Politics*
*July 9,1992*

## A Reply

While the Khasi Jaintia Environment Protection Council (KJEPC) delegation, were discussing with officials in the Prime Minister's office, the KJEPC's stand on uranium mining and its demand to declare the Khasi and Jaintia Hills as a Nuclear Free Zone, we were shocked to read Sujit Kumar Chakraborty's article entitled: "Funds Allocated for Setting up of Uranium Unit in Shillong."

The article was revealing, both in its detail and scope of uranium mining and processing to be undertaken by the Government of India and also regarding the double standards of our political leaders, for in Shillong, the Meghalaya Federation of Regional Political Parties has passed a resolution against uranium mining and processing. According to press reports in Shillong, Mr D D Lapang, the Congress Chief Minister of Meghalaya has taken up the matter with the Prime Minister.

The Janata Dal in Meghalaya has also issued a statement opposing uranium mining in Khasi and Jaintia Hills. The Hynniewtrep National Council, a newly formed political party, has also resolved to support the demand for declaring Khasi and Jaintia Hills as a nuclear free zone.

The last para of Mr Chakraborty's article contradicts his earlier ones. In fact, the West Khasi Hills Action Committee and the Sohryngkham Area Development Council had sent telegrams and copies of their resolutions on the subject to the President and the Prime Minister but no response has come till date.

*Rev.Prechard B.M. Basaiawmoit*
*Convenor, Khasi-Jaintia Environment Protection Council*

## From The Editor's

Recently, Jyotibhai Desai gave me **a** poem to read. I want to share it with you. It is written by a thirteen-year old child from SriLanka. And in these mad times, when the Chairman of the Atomic Energy Regulatory Board, — a person, whose first responsibility should be providing protection to the public, disregards mandatory safety **regulations**—(See following story) it is a solace to think that sanity still **prevails.**

### BOX OF COLOURS

I *had a box of colours*
*Shining Bright and bold,*
*I had a box of colours*
*Some warm and some very cold.*

*I see no red for the blood of wounds*
*I had no black for the orphan's grief*
*I had no white for the dead faces and hands*
*I had no yellow for the burning sands.*

*But I had orange for the joy of life*
*I had blue for the bright clear skies*
*And I had green for buds and nests*
*I had pink for dreams and rests.*

*I sat down and painted*

*PEACE*

ADVERTISEMENT

The nuclear industry works internationally. This is one important reason why I wait for each new issue of Anumukti: The resistance against nuclear power also has to cut across national borders.

We are preparing for an international exchange programme for young activists, starting in November/December this year. If the necessary funds can be collected in time, we want to give a young activist the chance to experience the resistance around a nuclear waste dump as well as around three nuclear power stations near Hamburg in Germany for a period of about four weeks. In exchange we expect the activist from abroad to share her/his experience with groups and initiatives, here. Accomodation will be in the Kurve Wustrew, a training centre for non-violence.

Please invite the younger generation of activists among your readers to contact us at the following address:

• HagenBerndt
c/o Kurve Wustrow
Kirchstr. 14
D-W3135 Wustrow

# Critical Safety Checks Not Being Observed In KAPP-1

BOMBAY, JULY 25: Sources within the nuclear power industry are concerned about "a serious lapse" in ckecking vital safety installation at Unit-1 of the Kakrapar nuclear power project, which is due to be commissioned shortly. The "unwarranted haste" to achieve criticality, overdue by a year, has caused the project authorities to allegedly bypass 'integrated testing' of the "Emergency Core Cooling System" (ECCS). This is the only backup system available in case of a 'loss of coolant accident', and its failure could lead to a 'core melt down accident', they warn.

According to these sources who wish to remain anonymous, integrated testing of the ECCS is practically possible only once in the lifetime of a reactor. This backup system automatically comes into play during a 'loss of coolant accident' (LOCA), when the normal reactor coolant drains out, and is not available for cooling the reactor core. This situation may arise if there is a breakage in any of the complex web of pipes that cool the system.

Under this integrated test, a LOCA is simulated, and all components of the ECCS are evaluated, with the primary heat transport system pressurised and heated up. In this simulated test the reactor core is not loaded with heavy water, and is instead flooded with ordinary (light) water. Once the reactor is set for critically, and the Primary Heat Transport System (PHT) is filled with the expensive heavy water, the integrated testing of ECCS is not possible.

Although injection of light water into the PHT is a component of the ECCS, its activation in a non-emergency situation would seriously harm the PHT system bacause the highly radioactive heavy water would contaminate ordinary water, becoming "downgraded" in the process. With heavy water costing Rs 10,000 per liter, and the PHT holding at least 40 tonnes, this would cause a major economic loss.

According to these sources 'integrated testing' of the ECCS is a mandatory regulatory requirement, and no other subsequent commissioning activities such as fuel-loading, addition of heavy water in the PHT system, can be permitted till this requirement is met. Apprehension *on* this aspect are clearly expressed in a note written by K. Natarajan, chief engineer (instrumentation and control) and a member of Kakrapar Design Safety Committee (KDSC). (See Box)

The Atomic Energy Regulatory Board (AERB) authorities, who were shown a copy of Natrajan's note, said they had no reason to doubt its authenticity, but dismissed its contents as opinion".

According to sources, this note make amply clear that 'integrated testing' of ECCS was not performed at all, or if performed, did

## POWER MATTERS. BUT SAFETY MATTERS MORE IN THE OPERATION OF NUCLEAR POWER PLANTS.

Ensuring continuous cooling of reactor fuel and maintaining integrity of five successive barriers between radioactivity in fuel and the public, are safety requirements of the highest concern constantly achieved by specially licensed plant operators, strictly adhering to Technical Specifications" issued by the regulatory body which reviews their compliance regularly.

## DOES IT REALLY?

## ECCS Tests in KAPP-1

Refer Report No KAPP/ 33350/ 92/B dated April 09,1992.

The tests have been repeated and new operating points set. They are acceptable for KAPP-1 operation.

However, a total integrated test with all the subsystems, components and logic functioning, should be done to confirm performance as per design intent in toto.

This must be done in KAPP-2 as soon as the system is ready and any retrofitting found necessary based on this test should be taken up for KAPP-1.

*K.Natarajan*
*28.4.92*

I agree. This would be done in KAPP-2

*G.Ghosh*
*29.4.92*

not meet with design requirements. They also state: 'The note also reveals apprehension regarding proper functioning of ECCS, else, the note would not have mentioned integrated testing of KAPP Unit-2 and possible retrofitting in KAPP Unit-1."

The sources further reveal that the NPC has permitted loading of fuel in KAPP Unit-1. This implies that the uranium rods and the heavy water are already loaded into the system, making it impossible for AERB to now demand compliance of the ECCS integrated test. 'The KDSC and the chairman, AERB, have overlooked the serious lapses in commissioning ECCS by the KAPP site management, by permitting the NPC to load fuel in KAPP Unit-1. No regulatory body anywhere in the world has displayed such gross lack of concern for safety by condoning inadequate testing of ECCS, the failure of which may lead to the severest nuclear accident," it was held.

The chairman of AERB, S. Soman, explained his stand during two hours of discussion with this reporter on Thursday, (23.7.1992) followed by questions submitted in writing and their reply similarly forthcoming. During the discussion, Soman revealed that "the process of criticality (for KAPP-1) has already started, and the review committee is going through that." Kakrapar Unit-1 is a replica of other CANDU type reactors, hence "safety is ensured". "We are not here to answer why it (integrated testing) has not been done, it is not our business. But we have to be satisfied that all tests have been properly done. They have to submit results of all experiments and if they are satisfactory, then only will our permission be given," he added.

When shown Natarajan's letter, Soman said he would confirm the specific position with Kakrapar Unit-1, but nevertheless defended "individual testing of the ECCS components", holding that "integrated testing could not be simulated." It is accepted that you test part by part, and be satisfied that all systems are normal. Integrated testing is by checking the design and indirect measurement, you look at it part by part. During the process of reviewing these, opinions (as by Natarajan) are being expressed."

Subsequently, in a written response, the AERB avoided use of the words 'integrated testing', as pointedly referred to in the written questions, and instead referred to "complete" ECCS tests. "Complete ECCS testing was tried out Narora 2 before it went critical. Some deficiencies observed during the tests were rectified and necessary tests to ensure the performence of rectified system carried out. ECCS at KAPP-1 is identifical to the one at Narora-2," it stated. Asked about "integrated ECCS test" at KAPP- 1, AERB said, "Complete ECCS has been tested for its functional performance at KAPP-1 before addition of heavy water to the PHT system." Asked about AERB's stand on testing ECCS before the reactor went critical, and whether "in toto testing" is an essential requirement, it replied, "ECCS should be checked for its performance before a reactor goes critical. Any deficiencies observed during the tests have to be corrected and functional checks carried out to ensure that the system functions as per safety requirement."

Meanwhile an independent expert, Shri R. Ashok Kumar, an electrical engineer and authority on energy audit, holds the failure of the CANDU type reactor design as serious. He questions why the Moderator Inlet Manifolds at MAPPS (Kalpakkam) broke in a 1990 incident, and whether it was a "remote possibility" at Narora and Kakrapara, thereby questioning the sound working of the Cold Moderator System in the event of LOCA under ECCS failure. "Inability to conduct full scale tests needed for LOCA, ECCS and Cool Moderator Inlet Behaviour raises serious questions over solution to the safety problem itself," he said.

*Rupa Chinai*
*The Sunday Observer 26.7.1992*

# So That Others Might Live in Peace

## Navstar Satellite Disarmed

Just before dawn on Sunday, May 10, 1992 Keith poller and Peter Lumsdaine entered Building 86 at Rockwell International's world headquarters in Seal Beach, California, where they partially demolished a NAVSTAR-GPS global targeting satellite and parts of the dust-free "clean rooms" where these satellites are assembled.

NAVSTAR-GPS ("Global Positioning System") is a far-reaching military "force multiplier" program, half-way to full deployment. Already in partial use, NAVSTAR will increasingly provide extremely precise data on the exact position, altitude and velocity of any designated object to U.S.military, police, intelligence or high-level corporate user, with less exact positioning offered as a spin-off benefit to the commercial/civilian sector.

If NAVSTAR program is allowed to go forward it will increasingly: guide counterinsurgency assault teams and gunships on search-and-capture or search and-destroy missions against Third World resistance movements, "illegal" refugees, and indigeneous communities in previously remote rain-forest/mountain sanctuaries or urban slum back alleys-day or night anywhere on the planet; and

- provide the Pentagon's nuclear missiles with the unprecedented accuracy needed only to start and win World War III through a catastrophic first-strike on the nuclear deterrent forces of any future rival, especially a resurgent Russia or Eurasian alliance.

NAVSTAR also greatly facilitetes corporate-state surveying and mapping of every remote wilderness, desert, rainforest and indigenious nation on Earth for "resource" exploitation and control. In the war against Iraq, NAVSTAR guided much of the bombing campaign, including B-52 launched cruise missiles destruction of Iraq's civilian infrastructure.

## Axing The Satellite

After slipping into Rockwell's fenced and patrolled Space Systems compound with tool boxes, the two unarmed saboteurs changed from black apparel to regular work clothes with Rockwell-logo shirts and fascsimiles of company security badges, which they were wearing when apprehended in Building 86.

The steel mesh reinforced windows to one NAVSTAR "clean room," containing seven uncompleted GPS satellites, were removed with an ordinary wood splittingax, introducing un filtered air as well as specks of glass and metal into the dust-free environment, potentially causing problems for the precision satellites being assembled there. The door of a second clean room was meanwhile broken open and one NAVSTAR inside was struck about 60 times with another ax. This completed satellite, awaiting shipment to the pre-launch facility at Cape Canaveral Air Force Station, has had to be completely disassembled by Rockwell technicians to assess and repair the damage. To date, damage is estimated to be at least $ 5.5 million. Rockwell and government sources reportedly say this figure is expected to rise as the investigation proceeds.

Armed security and other Rockwell employees were present in the building and within a few minutes Lumadaine was seized at gunpoint. Kjoiler was tackled and choked unconscious, later requiring stitches over his blackened left eye. Before being assaulted by security guards, both clearly stated they were unarmed, and they neither threatended nor struggled with anyone.

Kjoller and Lumsdaine, who issued a three page statement after the action, chose the name The Harriet Tubman-Sarah Conner Brigade" for their nonviolent direct disarmament effort. The name honours the 19th century "Underground Railroad Conductor" and the fictional nuclear resistance fighter of the popular movie *Terminator II:Judgement Day.*

## A Call To Conscience

Their statement affirms:

*"NAVSTAR" is the space-age mechanical bloodhound of the world masters, guiding their hired guns as they track down the rebellious and runaway slaves of the corporate state, from the mountains of South and Central America to the back alleys of South Central Los Angeles. And it is also the real-life Skynet/Deathstar of our culture's movie theater nightmares, propelling the Earth's peoples toward an automated global holocaust of nuclear fire and darkness.*

Kjoller and Lumsdaine are from Santa Cruz, where Kjoller earned a degree in sociology from University of California and produced a radio program for the University radio station. Lumsdaine lives with his four year daughter Lucy and is a member of the local Pax Christi group. He has worked for two years as the coordinator of the Silicon Valley's Interfaith Peace Coalition. Both have been actively involved in previous civil resistance movements in the area.

In a letter to the judge, Lumsdaine explained the factors that influenced his decision to act:

*"Lucy and I are very close emotionally and my devotion to her is very strong... I of course realised that the action I took might result in a substantial period of physical separation from Lucy, a fact that deeply concerned me. Nevertheless, I took this action just as other devoted parents in various lines of work—international relief workers, soldiers, journalists, diplomats and even clergy members—find it their duty in conscience to take certain risks in their line of work which may result in extended separation from their children and families or in capture, injury or death. I strongly believe that people, including parents of young children, have a responsibility to take serious risks at times: to defend children from the socio-economic, ecological and military violence that is inflicted on them in many areas of the worla; and to defend all children, including their own, from the threat of global nuclear holocaust, a threat which remains perilously real notwithstanding the currently fashionable but short-sighted conventional wisdom.*

Under current sentencing guidelines, Kjoller and Lumsdaine are expected to receive a sentence of around three years, plus possible supervised parole, fines and restitution.

Kjoller and Lumsdaine request that people support them by:

- Resistance organising against NAVSTAR and the corporate war machine.

- Short letters of support/encouragement to Lucy, Peter Lumsdaine's four-year-old daughter, c/o Jean Peterson P.O.Box7061 Santa Cruz, CA 96061 U.S.A.

For more information, contact:
The Tubman-Conner Brigade
c/o Maxine Ventura
P.O.Box 11645
Berkeley CA 94701
U.S.A.

*The Nuclear Resistor*
*June 19,1992*

# Et Tu Brute

## Can Nuclear Pay Its Way In India?

*Nuclear Engineering International is an industry journal, and that is precisely why the following article is important. This is the first time that I have come across a piece in an industry journal that so clearly talks about the hidden subsidies enjoyed by nuclear power. We are reproducing the article in full, without any editing.*

India's economy is to a great extent centrally planned, and electricity supply, like other essential industries is nationalized and subsidized. All sources of supply are supported — coal, for example, is transported by rail at less than cost price — but the government decides which sources should be favoured. While Rajiv Gandhi was enthusiastic about nuclear industry, the new administration under Narasimha Rao has other priorities, and under pressure for, inside and outside India it is reducing subsidies and introducing some market policies.

At first sight the India nuclear industry seems to be moving successfully towards a commercial footing. Responsibility for plant operation and construction was devolved from the Department of Atomic Energy (DAE) to a quasi-commercial company, Nuclear Power Corporation (NPC), in 1987. The new arrangement allowed NPC to obtain provate financing, make its own investment and operation decisions and retain any profit. According to NPC the company has had a good record, making profits of up to Rs.750 million in its first three years and selling power at prices similar to those of coal fired plants. Such figures would give NPC a rate of return of around 11% — a considerable achievement when the average rate of return of India's nationalized industries is barely above *1%.*

NPC is able to keep its prices low and record a profit because of continuing support from central government. It is subsidised in a number of ways:

### Fuel Price:

NPC buys its nuclear fuel from the Nuclear Fuel Complex (NFC), another quasi-commercial company of the DAE. If all the production costs were taken into account, fuel bundels would cost around Rs 1,000 each. Instead, the fuel is "hired" from NFC at an administrative price set by the DAE. In 1989/90, NPC's total fuel bill, including the first load for Narora-1, was Rs 21.6 million. The price of fuel, however, is now being gradually increased to a more representative value.

### Heavy Water Price:

The true cost of NPC's heavy water would be around Rs 4,000/kg. In practice, it is assumed to be a non-depreciating asset and is leased to NPC. The company's total heavy water bill in 1989-90 was Rs 18.7 million.

### Research and Development:

NPC has no research and development capability of its own, although a small laboratory is planned. It relies on DAE facilities at the Bhabha Atomic Research Centre (BARC) and elsewhere. These DAE facilities provide a variety of services for NPC: they provide experts for planning or problem solving groups; they design and manufacture high technology or one-off equipment that cannot be supplied by Indian industry; and they are always available as a reservoir of expertise. The DAE budget for research and development totals Rs 2,100 million. The budget covers more than just nuclear research and development — BARC's work, for example, extends to food irradiation, new alloys and electrical goods — but only now is the DAE's resarch for NPC beginning to move to a contract and payment basis. Previously, the two organisations continued to work on the informal basis that was in operation when both were run directly by the DAE.

### Waste Disposal

Althogh NPC, through each plant, deals with its own low and intermediate level waste, it has no responsibility for spent fuel. This is stored at the plant until it can be moved to BARC or another future site for reprocessing. None of the costs are borne by NPC: research and development for reprocessing technology is carried at BARC and it is assumed that the cost of transport and reprocessing of fuel, as well as any subsequent decommissioning costs, will be covered by the value of the plutonium recovered.

### Risk Insurance

NPC bears none of the costs of insuring against the risk of a nuclear accident or of compensation in case of such accidents — this is assumed to be a government responsibility.

### Rajasthan Atomic Power Station

The two unit plant at Rajasthan is regarded as a prototype and is still owned by the DAE. It is operated for the DAE by the NPC.

## Indian Plant Derating

- Tarapur: 2x220 MW BWR

Startup: 1969
Derated to 160 MW due to corrosion in steam generators and damaged generator rotors.

- Rajasthan: 2 X 220 MW and 2 X 235 MW PHWR

Startup unit 1 1973, unit 2 1981, units 3 and 4 due 1995
Units 1 and 2 derated to 100 MW due to leaks in calandria and shield wall (now mechanically sealed) and cracks in turbine blades.
Units 3 and 4 are expected to be derated to 220 MW.

- Madras: 2X235MWPHWR

Startup unit 1 1984, unit 2 1986
Operating at 175 MW following failure of inlet manifold. Derating likely to be permanent.

- Narora: 2 X 235 MWPHWR

Startup unit 1 1990, unit 2 due late 1991.
Construction was delayed because of backfitting and testing new safety systems.

- Karkrapar: 2 X 235 MW PHWR

Startup unit 1 due early 1992, unit 2 due late 1992.
Expected to be derated to 220 MW.

- Kaiga: 2 X 235 MW PHWR

Startup due 1995
Expected to be derated to 220 MW

### Investment

As a commercial company, NPC is expected to raise one third of its financing from internal resources, one third from private borrowing and one third from government funds. At its healthy rate of return, NPC has been able to attract private funds but its internal resources are low and government funding has been raised to 50%. Nor are these the only subsidies. In the past, the government has been willing to compenate NPC directly if production costs cannot be met by the electricity price.

### Assets

Nevertheless, if the Indian nuclear industry has commercial power production as its aim, it does now have some of the right ingredients:

### A Standardised Design

The six units currently in operation have very different designs and have been plagued by problems. In contrast, the next 12 units—Narora 1 and 2, Rajasthan 3 and 4, Kaiga 1 to 6 and Kakrapar 1 and 2 will have a standard design, referenced to Narora 1, which incorporates all post Three Mile Island (TMI) upgrades.

Faster Construction

NPC aims at construction times around six years for the current pressurised heavy water reactor series.

### A Qualified Industry

When the Indian nuclear industry was isolated in the 1970s, Indian companies could not supply components or equipment qualified to nuclear standards. The DAE and more recently NPC, have worked to upgrade local industries and now, although components cannot be bought "off the shelf," two companies have "N" stamps, and NPC has the security of regular supplies.

### Indigenous Suppliers:

Early plants were held up when components from overseas were unobtainable. For example, the startup of MAPS 2 was delayed for ten years by a shortage of heavy water. Nearly 90% of the components are now Indian made, and mechanisms are in place to allow the DAE to work with industry where specialist equipment is required. Using local supplies also helps in conserving foreign exchange.

### Cheap Manpower

Manpower cost in India is half that of Western countries, although a much smaller proportion of the work is automated.

Indigenous suppliers and the low cost of staff have already contributed to the low costs of Indian plants, according to P.K.Iyengar, Chairman of the Indian Atomic Energy Commission. Capital costs of Indian plants were around Rs 25,000 per kilowatt ($l,000/kw) and running costs are also low.

It remains to be seen whether NPC can make the most of its assets. Indications are that although NPC, and not the DAE, is making operating decisions, commercial thinking is still a long way off. Western suppliers, for example, have found delivery dates for their components put back as construction schedules are stretched.

In the medium term NPC is going ahead with plans for a new 500 MW reactor, although estimates are that capital costs and electricity price will be more than double those of the 235 MW series.

Commercial electricity production is not the only goal of a nuclear power programme such as India's. The implementation of such a programme brings with it a measure of international prestige, and associated research and development can give great benefits in "spin-off' technologies. But the overriding concern as Iyengar pointed out in a recent lecture to the Indian Institution of Engineers, is that "a minimum level of electricity production is essential for our survival."

The danger for the nuclear industry is that it may overestimate its importance in meeting that objective. Even with India's uranium and thorium resrves and with the problems associated with fossil fuels, unless nuclear power can show some commercial advantages, in a harsh economic climate it may be all too easy to replace the nuclear 2.5% with simpler cheaper technology.

*Janet Wood*
*Nuclear Engg International*
*December 1991*

# Die, Brother, Die

## The Atomic AIDS of Semipalatinsk

"C*ome, dear guest from abroad, don't ask too many questions, but do take more pieces of the ram. We have slaughtered it for you."* The faces at the dining table shine with vodka and fine speeches: the plates are filled with mutton and noodles; the Chairman of the district Soviet, the Mayor of Dolon and all the other dignitories of the village beam with delight.

*"Come, dear guest, don't be too inquisitive, drink the glass empty, because you are in Kazakhstan: And the best thing to do is to pour another glass down yourself, because you are at the "polygon", the testing range."*

Vodka has always been a good antidote for radiation, says the Chairman of the district Soviet, without smiling. In the early fifties, when the first bombs were dropped, the army occasionally gave orders to distribute hundred grams of vodka to the farmers around the Polygon.

During the explosion the school children had to line up in front of the school at the hour of the exciting spectacle and look up to the horizon. A red ring grew in the sky, became larger and larger, sank to the ground, became whiter and whiter, grew legs, penetrated into the soil and rose again as a majestically ugly mushroom cloud.

*"Look at me, dear guest, I am 45, boasts the Chairman, but don't I look younger? The atom dose it, it keeps us young."*

In the course of the years between 1949 and 1989 the red ring in the sky glowed and turned itself into the mushroom cloud 166 times; the bombs exploded 343 times underground and made the windows rattle.

*"Take more mutton, dear guest, have no fear; our village supplies meat and vegetable to Semi*palatinsk, and people are ofcourse still alive there!"*

500,000 Kazakhs live around the testing range. Fallout equivalent to 15,000 Hiroshima-bombs have rained upon them. The army generals were playing Russian roulette with the people: The direction of the wind determined if the radioactive cloud would sail over the villages in the south, north, east of west.

When he once travelled abroad with his family, says the Chairman at the table, the Russian customs officer asked him, after looking at his passport, doubtfully: "What, you are from Semipalatinsk? But your children look so healthy?'

Their native place Dolon is in the north of the Polygon; opposite, on the other side of the atomic landscape, is Kainar. Usually the wind blew in this direction.

Whenever Danletkali Kodjajew, a hunter from Kainar, saw the atomic mushroom proliferating in the sky, he drank snake's blood, mixed with horse milk, and looked forward to hunting. The wild goats, deers and wolves were disturbed during every explosion, making them an easy catch. But this 62 year old man has not got hold of a hamster since long, even swallows have vanished from his hunting grounds.

When the earth shook, he knew, that somewhere on his next expedition he would come across a new hill or a new valley.

Kodjajew wanders even now through the hills, for hunting, thought it is prohibited since three years to eat that meat. Since even the soldiers give him hunting orders, the game should not be so dangerous, he hopes. Once in a month he could eat meat, the officers tell him, it doesn't cause any harm.

He should not talk too much, calls out Kodjajew's wife from the bedroom into the passage. "She is still afraid", he confides in his husky voice. Till three years ago, it was actually prohibited to talk about the bomb." He beckons us over to the kitchen of his hut.

His son is standingon the kitchen bench and covers his ears. He stares at the bulb of the ceiling light. He ignores us. Kodjajew ignores him. His son is insane, the father tells us later. Every child in Kainar lacks something, either the fingers or the arms, either the speech or the sense.

Recently Kodjajew tracked down a four meter long snake under a rock. It was without the hindquarters.

Samakal, the son of the hunter, is 32 years old. He suffers from congenital moronism. If this son doesn't take the medicine that quietens him down regularly, says Kodjajew, he bahaves like a rabid wolf. Samakal cowers in the comer of the kitchen and pulls at his thin goatee beard. He repeats every sentence of his father like an echo, without locking up.

"Only drunkards get such sons", the doctors used to abuse Kodjajew. He never drank, no vodka, no beer, only occasionally kwas. "I am a simple man", says the hunter, "but I can build a car". His carriage is parked in the yard. Kodjajew has built wooden bodywork around the chassis of a motorcycle. His car has space for two persons, has a big luggage aarea and runs 60 km per hour.

Samakal follows us, apparently indifferent, to the yard. He kicks a cow that blocks his sight, at the hind leg, till he trots off.

The house wife has woken up and calls for a brandy. She is sitting on her bed, under the picture of a lion, and writhes with asthama attack. She is ashamed because she is not keeping well, says the 62years old. The illness has wrickled her face like that of an 80 year-old.

She nursed her son for such a long time, she laments, till she herself feel ill. Samakal repeats her words. He sits on his bed, under the poster of Arnold Schwarzenegger, and swings his body to and fro.

Both patients are now nursed by the daughter. Surrounded by illness all her life long, she decided on her early age itself to become a medical doctor. Now she is crushed by the ubiquitous infirmity in Kainar. In the neighbouring house 50 years-old Nurkan Suneejewa, who can walk only on crutches, is suffering. Her sister cannot even get up any more.

Fifteen beds are available in the small hospital of the doctor, but atleast 100 villagers need treatment every month. 201 out of 3500 villagers have already died of cancer.

The number of deformed children is growing, the most serious cases perish anyway shortly after birth. Their nember tripled in the last three years. Every fifth child is born dead.

Japanese doctors who visited Kaniar and measured the radiation, told their colleagues: "You can't live here any more."

In the neighbouring village Sarshal, about 100 kilometers away, a highly dangerous quantity of the nuclear fission product Strontium 90 was found. It destroys the bone marrow and thus prevents the formation of blood. The radioactivity in the blood, urine and excrement of the farmers is 120 times higher than expected due to natural radiation.

Leukaemia, anaemia, asthma: hundreds of villagers have fallen ill and perished. 11ldied of cancer, 97 died by hanging. Only the strongest farmers in Sarshal, about 23,000, have survived the radiation; and the wisest among them gather occasionally in the council of elders to record any new signs of threat.

The gases leak out of the 'borehole 918' near the village which the military maintained in the steppe, in order to measure the convulsion in the bowels of the earth. The earth is screaming", say the elders. A shepherd with a broad for cap says that a jeep with two soldiers approached the borehole with gauges. They fled form the spot, as if hounded by wolves". Another describes a huge toungue of fire sticking out of the 'borehole 1010'. It was extinguished thrice.

Muratchan Korganbajew, the Chairman of the village committee, has found fresh deep holes and suspects that new tests are being planned or nuclear waste is being dumped secretly.

Korganbajew, 54, suffers from a terrifying growth of extremities: the hands, the legs, the head and even the tongue swell up. As if someone is pumping them up.

Melgis Metow would be happy if someone would give attention to his suffering. He is just weak and ill. He stutters, he cries, he looks tired; but this is the condition of many 54 year-olds in Kazakhastan. Metow's left eye flutters in the rhythm of a wild melody when he talks about his life as a soldier. He was forced to keep quite for 30 years, was intimidated by occasional visit of the KGB and by his faith in Soviet power.

The distance between him and the nuclear mushroom was 15 kilometers when soldier Metow first experienced the nuclear explosion. It was so bright that he was afraid, he would go blind Inspite of his dark glasses; when the shock faded away, the view of the man-made natural spectacle excited him. He saw a whitish-yellow ball that turned first into orange and then bright red, and grew and grew, till it filled the whole sky. A huge, white smoke cloud rose from the earth. Its surface blazed in shining red; a thick stem grew in slow motion from the bottom till the cloud stood majestically over the steppe...Deathly silence.

Metow saw the explosion storm drawing near, saw an invisible wave press the grass in the steppe, felt for seconds the heat of campfire inspite of the cold of the autumn, just before he pressed his head on the earth.

The wave shook up Metow and chased him into the hut where he lay down at the door. Windows, though open, shattered.

Half an hour leter he and the other 59 soldiers of the special pioneer unit No. 52605 were given cotton overalls and gumboots. They got breathing apparatus and the order to move towards the centre of the explosion.

In the months prior to these moments of destruction, 20 000 soldiers constructed the four storyed buildings, laid the pipes, parked the cars, constructed the illusion of a town. Now the special unit inspects the ruins in order to measure the power of the destruction; they collect the dosimeters which they had installed earlier, and also the chicken, pigs and sheep which they had released.

Cars and tanks are burnt down, the houses have collapsed, water flows out of the broken pipes. The town is as if it were painted with a black paste. Even the underground metro is damaged, but it still runs.

Metow and his comrades work their way gradually up to the centre of the inferno. Their goal is to reach a bunker which they had, before the zero hour, crammed Ml with gauges. A pin, attached to their clothes, measure the absorption of radiation without they themselves being able to understand the recordings.

Only 30 years later is Metow being informed, after he repeatedlly requests for a certificate, that he had been exposed to radiaton of 3.05 roentgen for 41 days. Metow doesn't trust that paper. After all a nuclear bomb was exploded every second week in the two years of his military service during 1961 and 1962.

In the last minute panic, the scientists and the generals let the sky over Semipalatinak glow because, from August 1963, atmospheric nuclear tests were forbidden.

The Chinese and the French continued to bomb overground, the Americans and the Soviets blasted henceforth under the earth. Together, they have triggered off 1800 nuclear explosions till today and spread radioactivity equivalent to 40,000 Hiroshima bombs on the earth. These radiations will, according to an international study, lead to the death of 430,000 people of cancer by the year 2000.

One third of the 343 underground nuclear tests in Kazakhastan did not remain under the earth. Radioactive clouds emitted from the brusting rocks and spread over the villages.

The nearer they live to the source of fright, the sooner people commit suicide. In the non-radiated areas of Kazakhastan, 2 out of 10 000 people hang themselves. In the area 160 kilometers from the testing range, the suicide rate is 24; at 120 kilometers distance it is 47 people, and at a distance of 40 kilometers, 80 out of 10 000 Kazakhas commit suicide.

Many people like Arnold Steiger fear that they have cancer. The farmer from Sarshal hanged himself three years ago. His father, George Steiger of German origin, laments in the council of the elders that military have not even paid for the damages of the buildings which their bombs have caused.

Each time, the roof of his house was swept away by the shock waves. Steiger was staying only three kilometers away from the Polygon till last year. Only once the soldiers dumped ten asbestos sheets, some cement and a few planks in front of his hut.

Every furrowed face in the council of the elders expresses fury. But Korganbajew, the Chairman of the village committee with the terrifying growth of extremities, shouts it out, the contempt, so loud as if his vocal chord also grew in the course of the decades by radiation.

The villagers were always being examined thoroughly: the farmers from Sarshal in Semipalatinsk were being investigated for many days in the secret hospital No. 4; the medical personnel were sniffing around in the village for weeks; the gauges were constantly registering the radiation,—"but we, the people who live here, don't know the whole truth about ourselves."

The snow-covered landscape between Sarshal, south of the Polygon, and Dolon, in the north, appears from the helicopter like a natural park. Wild horses run through the steppe, sheep look for food, wolves draw their circles. But some or the other hill appears to be artificial, as if man and his bomb have modelled them. And ofcourse the seas - neatly circle precision work.

At 50 degree north latitude and 79 degree east longitude, where the frozen rivers Shagan and Ashtshyssu meet, one finds the most beautiful creation of these lakes. The crystalline white snowcover glitters in the sun, the brown white jagged edge looks as if chiselled by the diamond cutter.

"1004" is the name of this pearl. It has a diameter of one half of a kilometer and is 100 meters deep. Created on 15th January 1965 at 5.59 hours through a nuclear explosion that had a strength equivalent to nine Hiroshima bombs. The sea is the monstrous product of that mind (which existed at that time not only in the USSR), which thought that man could construct canals, lakes and ports with nuclear power.

120 "peaceful" bombs were exploded in many parts of the country between 1963 and 1988 in order to divert the rivers, to tap oil fields or to creat underground caves, - the dictatorship of the proletariat carrying forward the class struggle against nature.

When the atmospheric nuclear explosions were banned in 1965, soviet scientists invented a good excuse: the experiment 1004 has "by mistake" drilled through the earth surface. Iodine 131, Caesium 137 and Strontium 90 were blown all over the steppe.

The radiating lake "1004" served later to water the surrounding meadows and for fish-farming. The anglers appreciate the catch which they fish from the water - inspite of presence of Strontium 90, one thousand times in excess, compared to non-contaminated water.

This fission product requires 29 years to reduce itself to a half. More than half a million people around the Polygon have absorbed this and other radioactive particals through respiration, food and skin. They cause cancer in the body and destroy the genetic make-up; continuing the process through the next generation and the generation thereafter and so on...

In the hospital of Dolon, three generations of infirmity are being treated. The 71 years old Balanowa suffers from gullet cancer, the 42years old Aldishewa has bronchiatic asthama and Olga, 14 years old, is struggling with nephritis.

Olga has never seen an atomic mushroom in her life, but she knows well how it looks like. It is always around her since the time she could think. And it is growing, from the moment she suddenly got fever two years ago and had to urinate often.

The kidney pains come in longer streches and force her to leave the school and stay in the hospital. The pain is unbearable without medicine; at present the hospital has no medicine; Olga couches curled up in her bed.

Olga's parents were children when, about 100 kilometers away from Dolon, on 29th August 1949 at 7.00 hours the "RDS-1" exploded. RDS—an abbreviation for "Rossija delajet sama" means: Russia does it independently. The Americans call the first Russian nuclear bomb "Joe 1" affectionately, after Stalin.

Its explosive force: 20 kilotonnes, about one and a half of the Hiroshima bombs. Hight of explosion: 38 meters. Wind speed: 70 kilometers per hour.

The nuclear cloud, expanding in the low altitude, reached Dolon in about 90 minutes. The radioactive fallout rained for three hours on the village. Olga's parents belong to those 70 000 people who were exposed to the gamma rays.

Olga was never well in her life. She had pneumonia before she got nepritis, had skin rash before pneumonia, and before the skin rash... She has "allergy to her own body", the doctor says and he has many such young patients.

Every second child in the radioactive contaminated areas suffers from chronic diseases; the immunisation system of half of the population has "reached the lowest norm", says a government report;

40 percent of the boys are too ill or mentally disturbed to do military service; new born babies have very few helper cells in their body, like the AIDS infected babies.

The children of the nuclear-test-generation inherit the nuclear AIDS from their parents and grandparents; 60 percent of them have been identified as having defective chromosomes. A Kazhakhi doctor had diagnosed right in 1958 the defect in the immune system, caused by radiation. He called it "Kainar Syndrome." He was forced to stop his study.

In the strictly shielded hospital No 4 in Semipalatinsk, people were examined but not treated. More than hundred medical doctors examined about 50,000 victims of radiation since 1961, without treating them. When someone died, he never died of radiation, but always of influenza or of heart failure. The chief of this 'hospital' tells about the collaboration: The Soviet Government, the army chiefs and unfortunately also some scientists were not merely interested in the hydrogen bombs, but they wanted the nuclear tests to create the conditions closer to that of a nuclear war".

Olga, Altishewa and Balanowa will not survive this Soviet nuclear war against its own folk. The 71 years-old vomits all that she eats; she has metastasis in the lungs. The doctor in the hospital of Dolon has not even morphium to make her death easier, he needs an inhalator for the 42 year-old asthmatic, and for Olga painkillers and somewhere a dialysis facility.

The malicious effect of the nuclear tests is the delayed, quite death, laments the doctor. 'Semipalatinsk' does not have the support of a lobby in the world as 'Chernobyl' has. A few injections occasionally, sometimes a few tins of tomatos, that's all what has reached this secret disaster area from the international aid for the new States.

Since Kazakhastan has become an independent country, this hospital receives less medicine than ever before, criticises the doctor. He shows us the disheartening medicine cabinet, though the chairman of the district soviet nudges him to shut up.

*"Come, dear guest from abroad," the chairman says, you are in Kazakhastan, don't question so much, let us have our meals. "*

He has choosen the house of a family with three healthy children to offer the guest mutton with noodles.

We won't show him the midget and the bigwig twins anymore, whispers the Chairman to the village soviet. He thinks, our interpreter did not hear him.

*"Come, dear guest, take a piece of the fish. The round tea is safe. And its fish too. I myself have taken bath in "1004". And my son too."*

Sasha, the interpreter, sings a song, the song of a dying Cossack. Black crow, fly. bring this ring to my wife and tell her: I have merried another. I have married death.

*"Dear guest, drink and don't enquire too much, eat the apples from the Polygon. Don't they appear around and nutritious?"*

A patient in the hospital had asked us: "Had that all been a natural disaster?" He pulled his shirt up and showed us the tumours on his back as thick as a fist. "I will catch those guys," he hissed, "even if I have to dig them up from the grave."

*Cordt Schnibben*
*Der Spiegel*
*4th May 1992*

*Translated By: Arun Kotemkar*

ALTERNATIVES

# Untying Aids Knots in Nepal

Nepal's new found freedom through its discovery of democracy has proved popular with the 'free world'. In fact, the donor community's latest obsession with its newest tool for aid conditionality, the requirement for recipient countries to demonstrate 'good governance', probably helped to precipitate resolution of the pro-democracy struggle of 1989/90, so as not to threaten Nepal's access to the aid coffers. Few countries are so tightly strapped by foreign aid than this small, mountainous Kingdom and the established overseas agencies don't escape with a clean slate.

Nepal's options for power generation clearly illustrate many of the problems encountered in the aid game. As the country has no fossil fuel resources of its own, renewable energies have been seen as its panacea. The massive, untapped potential of the 6,000 streams and rivers that rush down from the Himalayas point to hydro-electric power as the obvious choice.

The former Panchayat Government, to its credit, had not dismissed the idea of small-scale, decentralised energy production. In 1984, it delicensed micro-hydro power (ie schemes generating up to 100KW), allowing villagers to create their own electricity supply and charge their own rates, independently of the Nepal Electricity Authority (NEA). The subsequent launch by the Agricultural Development Bank of Nepal (ADB/N) of a programme to subsidise village-level hydro schemes by upto 50% enabled people to capitalise on this new opportunity. Today, more than 650 units which provide power for agro-proosssing and a further 70 units which generate electricity have been built privately to service village communities.

The cost of NEA's micro-hydro projects averages around $8,000 per kW produced. Village owned and ADB/N subsidised schemes, on the other hand, have averaged about $1,500 per kW. This has been possible because the village entrepreneurs and Nepali hydro companies use appropriate technologies, local labour and components manufactured in Nepal. The connection cost works out at about $160 per household for lighting and $320 to generate enough power to cook. The government would never be able to elecrtify rural households at these rates. However, where there is a determined community that is willing to pay half the costs, government investment can be a fraction of the grid connection cost.

There is no shortage of motivation in the villages. Mustang district for instance, which lies in the rainshadow of the Annapurna Himal on the Tibetan plateau at a height of 3400m, offers a particular challenge for hydro schemes as water is scarce and irrigation is the first priority for water supply. Nevertheless, a number of successful hydro schemes have already been installed.

Micro-hydro engineer Bikash Pandey surveyed many of these sites some four or five years ago. According to Pandey, the drive and determination shown by these communities is quite remarkable. "When I undertook the initial survey for one of the villges, Muktinath, they insisted that I estimate the cost of the scheme there and then. After considerable discussion between the elders and the rest of the village, they told me that they wanted to go ahead. I returned to Butwel, expecting their initial enthusiasm to wane once I'd disappeared from the scene, but within three weeks, they were on my doorstep, having raised the full cost of the scheme, NRs 450,000. In the neighbouring village, Jhong, the community raised an astonishing NRs 192,000 within a week. When you consider that the country's per capita GNP is mere $180, the real significance of the investment becomes apparent."

Such is the drive for electrification, the nine independent companies in Nepal which specialise in building and installing micro-hydro plants are struggling to keep up with the demand. It is tempting, therefore, for Nepal's new Government to speed up the process by importing equipment or accepting foreign equipment offered as 'aid'. Government agencies are already under pressure from foreign donors to accept donations of equipment, usually inappropriate, or to buy from specific foreign suppliers in return for other goods and services. This poison pill of 'tied aid' may speed up the process initially, but will ultimately lead to disaster. Unable to compete with 'free' foreign machines, Nepal's fledgling micro-hydro industry will wither away, taking away with it the expertise needed to maintain and repair the equipment. Furthermore, in the long run, the upkeep of even 'free' imported machines will prove to be more expensive as all spare parts will have to be bought from abroad.

Attempts to set up a 100 kW hydro scheme in Sikles, a village of 250 families in the Annapurna area, have come up against this problem. Funding has been secured for the proposed scheme from USAID on the condition that all the equipment used is US-sourced. Quite apart from the business this takes away from the local manufacturing industry, there is no equipment produced in the US which is appropriate for the local condition. And, as US equipment is unfamilier in Nepal, it is harder to repair and maintain. In Eastern Nepal, 40 off-the-shelf Japanese machines have already appeared, and there are fears that more are on the way. There are also examples of Chinese turbines in the 200kW-1MW range that have been dumped on the market for less than the price of the steel used in their manufacture.

Another example of misdirected aid is a Finnish-funded electrification scheme near Pokhara. This grid extension programme, which is being provided 'free' to the villages being wired up, costs $4,000 per installed kW, just for power distribution. A micro-hydro scheme recently commissioned in Ghandruk village cost $1,500 per kW installed for the whole scheme, from diverting the stream to putting in the light bulbs. The scheme even imported specially treated timber transmission poles from Finland, with the excuse that it prevented deforestation in Nepal. The most scandalous aspect of the Finnish scheme is not extortionate cost, but the expectations that it raises. If one village gets wired up for free, what hopes is there in encouraging another to invest time, labour and money in setting up its own scheme?

In the UK, tied aid is suposedly limited on the ODA's Aid and Trade Provision (ATP), which represents more than 10% of the total aid budget. However, much of the rest is also tied, but in a more camouflaged form. The notorious £65 million Westland helicopter deal with India, which was no more than a straight subsidy for an ailing British company, rather than a project designed to enhance the development of the country, came from the main aid budget rather than ATP. In 1986, 79% of the total bilateral aid was spent on UK goods and services, and the situation is similar for many other donor countries.

Tying of aid is not always a deliberate move to protect a donor country's own interests; it sometimes stems from a fundamental misunderstanding of what 'aid' means. In his recent book reviewing of the last 25 years of development, *Mastering the Machine*, Ian Smillie points out that technology transfer is one of the greatest wrongs in the misguided lexicon of development. "It implies", according to Smillie, "that technology is something that exists outside of society. It suggests that technology can be handed across a desk, picked out of a pattern catalogue, or shipped by jumbo jet from the North to the South along with some 'technical assistance' to get it going."Technology transfer should mean the exchange of the capability, and the thinking behind the capability, both to enhance existing capacity and to support the recipient countries in their own design and development efforts, i.e. 'know why' as well as 'know how'. It is better to start with small initiatives and slowly build up capability. Five years ago, the largest Nepali-made turbine produced about 25 kW in power; today the same industry makes turbines which generate 250 kW. One of the mandates of the UN Conference on Environment and Development (UNCED) is to assess 'the transfer of environment tally sound technologies to developing countries'. The remit itself indicates that the process is seen to involve only one-way traffic. Unlike its largescale counterparts, micor-hydro is one of the greenest forms of energy on the planet, and hence is an obvious candidate for technology transfer. There is no doubt that micro-hydro could provide a truly sustainable power supply for thousands of communities around the world; in Nepal it has the potential to provide some 80% of the country's needs. While Nepal is way off target still, it has come a long way towards developing a decentralised system for power generation. However, its success and sustainability is dependent on nurturing the country's fledgling manufacturing industry.

That means saying 'no' to tied aid. If it succeeds in doing so, and frees itself from internal bureaucratic barriers, Nepal could have the last laugh as it watches the rest of the world scramble for the last of the fossil fuel reservers.

*Janet Bell ITDG*
*Hydronet 1/92*

# GEOTHERMAL ENERGY

Geothermal energy is an energy resource with cost, reliability and environmental advantages over conventional energy sources. Geothermal energy contributes to both the energy supply, with electrical power generation and direct-heat uses, and to reduced energy demand, with savings in the electricity and natural gas through use of geothermal heat pumps to heat and cool buildings. Only a small fraction of the geothermal resources are in use today. Much more could be brought on line in the short term with appropriate incentives.

## What is Geothermal Energy

Geothermal energy is renewable heat enery from deep in the earth. Heat is brought to the near-surface by thermal conduction and by instrusion into the earth's crust of molten magma originating from great depth. Ground water gets heated to form—hydrothermal resources—naturally occuring hot water and steam. Use of hydrothermal energy is economic at a number of high-grade sites. Hydrothermal resources are tapped by existing well drilling and energy conversion technology to generate electricity or to produce hot water for direct use. Earth energy is used by geothermal heat pumps. Hot dry rock, magma and geopressured geothermal energy have enormous potential, but cannot be economically developed without the benefit of further R&D.

For generation of electricity, hot water, at temperatures ranging from about 300 F to more than 700°F, is brought from the underground reservoir to the surface through production wells, and is flashed to steam is special vessels by release of pressure. The steam is separated from the liquid and fed to a turbine engine, which turns a generator. Spent geothermal fluid is injected back into peripherial parts of the reservoir to help maintain reservoir pressure.

If the reservoir is to be used for direct, heat application, the geothermal water is usally fed to a heat exchanger before being injected back into the earth. Heated domestic water from the output side of the heat exchanger is used for home heating, vegetable drying and a wide variety of other uses.

## Increases Energy Supply

Geothermal energy is here today—it is not merely a hope for the future. Approximately 5,700 MWe are currently being generated in some 20 countries from geothermal energy, and there are 11,300 MWt of installed capacity worldwide for direct-heat applications at inlet temperatures above 95 F. Since a typical nuclear power plant produces about 1,000 MWe, worldwide electrical production from geothermal energy is equivalent to that from 6 nuclear plants. (However, typical Indian nuclear plants have a capacity of 200 MWe, and hence the worldwide electricity generation from geothermal energy is equivalent to the production from 30 plants.—Editor)

As a result of today's geothermal production, consumption of exhaustible fossil fuels is offset, along with the release of acid-rain and greenhouse gases that are caused by fossil-fuel use. Today's geothermal energy use in the United State alone is equivalent to the burning of 60 million barrels (bbl) of oil each year, while worldwide geothermal energy use is equivalent to the burning of 150 million bbl of oil per year. For comparison, the entire U.S. Strategic Petroleum Reserve contains about 600 million bbl of oil.

## Hydrothermal Reserves

Geothermal energy is found in many places on the earth. It is an important source of energy in several third-world countries including the Philippines, Indonesia, Mexico, countries of Central and South America, and countries of eastern Africa. Among the developed countries using geothermal energy are Italy, Iceland, New Zealand, Japan and France, along with the United States. There is a very large geothermal resource base in the world, much of which can not yet be economically used. In fact, the resource base for the renewable energies-geothermal, biomass, solar, and wind-is much larger than the total resource base in coal, oil, gas, and uranium.

## Flexibility and Reliability

Systems for use of geothermal energy have proven to be extremely reliable and flexible. Hydrothermal electric power plants are on line an average of 97 of the time, whereas nuclear plants average only 65 and coal plants only 75 on line time. Geothermal plants are modular, and can be installed in increments as needed. Both baseline and peaking power can be generated. Construction time can be as litle as 6 months for plants in the range 0.5 to 10 MWe and as little as 2 years for clusters of plants totalling 250 MWe or more.

## Decreases Demand

No active technology for home heating and air conditioning is more efficient than the geothermal heat pump (GHP). GHPs are significantly more efficient than air-source heat pumps, central air conditioners and gas furnaces. GHPs use normal-tempreture earth of groundwater for heating during the winter, cooling during the summer and supplying water year around. The heat pumps itself operates on the same principal as the home refrigerator, which actually is a one-way heat pump. The GHP, however, can move heat in either direction. In the winter, heat is removed from the earth and delivered into the home of building (heating mode). In the summer, heat is removed from the home or building and delivered into the earth for storage (air-conditioning mode). On either cycle, culinary water is heated and stored, supplying all or part of the function of a separate hot water heater. Because electricity is used only to transfer heat, not to produce it, the GHP will deliver 3 to 4 times more energy than it consumes. It can be effectively used over a wide range of earth temperatures.

The GHP unit sits inside the home or building, at the site of a normal gas furnace. In a typical installation, a loop of plastic pipe is placed in a nearby vertical drill hole from one hundred to several hundred feet deep and the hole is backfilled with clay. A water/antifreeze solution is circulated through the loop and through the heat pump for removing heat from or transferring heat to the ground. There is no consumptive use of groundwater whatsoever, nor is there any contact between the solution in the plastic pipe and the earth or groundwater. Installation easily conforms to local construction and well-drilling regulations. Topical loop installations are warranteed for 50 years. In a 1988 survey of GHP buyers, 97% said that they were happy with their purchase and would buy again.

More than 100,000 electrically-powered GHPs have been installed in homes and buildings in the U.S. upto July, 1990. Additional installations are being actively promoted by investor- owned utilities and rural electrical cooperatives as a means of promoting energy efficiency and better managing demand. GHPs can cut 1 to 5 kilowatts (KW) of peak generating capacity requirement per residential installation.

## Positive Environmental Impact

The competing goals of increased energy production for worldwide social development and of mitigating release of atmosphere-polluting gases are not com pi table using today's fuel mix, which relies heavily on coal and petroleum. In the United States, electric utilities now account for 70% of sulphur dioxide emissions (the main cause of acid precipitation). 33% of our nitrogen-oxide emissions (that induce formation of ground- level ozone), and 20% of the release of gases linked to the atmospheric greenhouse effect, and 50% of all nuclear waste.

Development of geothermal energy has a large net positive impact on the environment compared with development of conventional energy sources. Geothermal power plants have sulphur-emission rates that average only a few percent of those from fossil-fuel alternatives. Nitrogen oxide emissions are also much lower in geothermal power plants than in fossil power plants. Nitrogen-oxides combine with hydrocarbon vapors in the atmosphere to produce ground-level ozone, a gas that causes adverse health effects and crop loses as well as smog.

There are other environmental advantages to geothermal energy. Geothermal power plants require very little land, taking up only a fraction of that needed by other energy sources. Other land use can mingle with geothermal plants with little interference or fear of accidents.

## Truly The Low Cost Alternative.

The real cost of energy is not all reflected in what we pay at the petrol pumps or in our electricity bills. Much of the true costs of energy, using today's fuel mix, are hidden. If the cost of corrosion damage, health impacts, crop losses, radioactive waste disposal, military expenditures to protact foreign energy sources, and direct economic subsidies to the fossil-fuel and nuclear industries were totalled and added to the energy bills we see, the price would astound us.

The answer to decreasing the true cost of energy is not to hide part of the cost but to alter our energy-use patterns and fuel sources to bring in much more renewable energy and conservation. If we changed our methods of utility regulation to require integrated-resource planning with all environmental and other hidden energy costs explicitly accounted for, it would be possible for utilities (electricity boards in Indian nomenclature—editor) to use more renewable-energy resources economically. Our total energy cost would decrease and we would have a much cleaner environment.

Accelerated development of renewable resources and conservation are the lowest-cost options in some cases, even with the hidden subsidies for the conventional energies.

If hidden subsidies were made visible in energy pricing, geothermal energy would be seen for what it really is—the energy bargain of the century.

For more information, contact the Geothermal Resources Council of the University of Utah Research Institute.

*SUN DAY 1992 Bulletin*

# Nuclear Skeletons Begin to Bark

*Reactor operation like the operation of any other complicated piece of machinary is both fairly simple and hellishly complex. In normal situations—which is most of the time, routine tasks have to be performed. These are straighforward and any technical person can be instructed to do them. It is only when the situation becomes for some unknown reason abnormal, that the importance of rigourous training becomes apparent. The 155 operators associated with the Dhruva and Cirus nuclear power reactors at the Bhabha Atomic Research Centre (BARC) at Trombay, who went on strike for more than a fortnight have once again brought into highlight the extraordinary dangers posed by the BARC establishment to the city of Bombay. The following article also demonstrates the total disregard of safety norms displayed by the nuclear authorities.*

n the words of the reactor operators, the attempt to rescan Dhruva with a makeshift crew of engineers and inexperienced technicians which was tried by the BARC establishment in an effort to break the strike was akin to "the nuclear power establishment playing with an atom bomb."

Standing instructions stipulate the presence of a minimum of ten qualified operatoes at any given time, whether the reactor is operating or not. In an attempt (ultimately successful) to break the strike, the BARC establishment, used a makeshift crew of two engineers, one trainee engineer and technical personnel from other parts of BARC.

According to the striking operators, the engineers were managing the control panels while the rest of the technical staff were deployed at various places in the plant to merely act as watchmen. "While they can read temprature and pressure gauges, they are not in a position to interpret them. They do not know how to stop or start operations, they have no practical experience. There are so many areas of this large plant that nobody is watching. The working conditions of a reactor are completely different and cannot be compared to other BARC operations," the operators said.

Elaborating on a worst-case scenario, association members pointed to the possibility of a power failure and the immediate need to keep the cooling system functioning. While there is a system of automatic restart, there is chance that certain isolated valves remain closed, affecting vital linkages. Maloperation by an unfamiliar operator could compound the situation. Failure to act within seconds to keep emergency lines working, could result in the reactor going out of control.

The fight to get official recognition of the BARC High Flux Reactor Operators' Association is held to be a means of collectively drawing attention to the violation of safety standards to which reactor operators are routinly subject. The association says individual grievances, recorded since 1972, have been consistently ignored and complainants have been victimised.

The demand for recognition of their association and access to independent redressal under the Industrial Disputes Act is hence an immediate objective, it was explained. Under the present system even the officially-recognised unions have no representation on the Atomic Energy Regulatory Board.

This is perhaps for the first time in recent years that staff associated with reactor operations have revealed details of their functioning, though on conditions of anonymity.

The association has highlighted specific instances showing how safety and health of reactor operators is being jeopardised. The AERB has confirmed these incidents, but maintained that radiation exposure is within "permissible limits."

On October 31, 1989, when the reactor was shut down, N.S.Maikar, an operator, was instructed by the Reactor Superintendent, R. Chowdhury, to enter the 'Loop Room', a shielded area with a strong radioactive field, to 'exercise (open and shut) the valves'. The reactor cannot start up unless this room is first locked with a master key. When the reactor is shut down, entry of personnel and the time they spend in the room is determined by Reactor Health Committee. The usual practice followed by RHC is to permit five minutes per person, exposing him to a 'permissible' radiation dose of 50 millirem at a time.

By accident Malkar's presence in the shielded room was overlooked, and the steel door, with concrete shielding of one foot thickness, was locked. The job had taken around ten minutes as operation of the valves preoved to be difficult. Meanwhile the reactor was turned on with power generation of ten MW. Failing to draw attention by banging on the door, Malkar finally managed to attract the control room's attention when he tripped the reactor by switching off the main coolant pump.

Although he was locked in the room for 20-25 minutes, RHC told Malkar that he had only received a dose of 10 millirem. It was also claimed that his detector, which indicates individual radiation dosage, was found faulty. Malkar has alleged irresponsibility and violation of safety norms by the authorities, holding that he was subject to a higher dose of radiation, and was not sent for a medical check up because the matter was sought to be suppressed. In February, he was made to fail a promotion test, as punishment for exposing this incident, the association alleged. Since this incident, a telephone has been installed in the shielded room, but it seldom works, operators said. According to AERB, Malkar was exposed to 260 millirem.

Other reactor operators, with over ten years service in Dhruva and Cirus, testified that in all these years, they hevebeen subject to only one cursory medical check up. They expressed apprehension of exposure to higher radiation usage than what is officially made out. Operators are routinely subject to high radiation risks as they are forced to enter the shielded room when the reactor is running on low power, less than 1 MW. in order to check the Failed Fuel Detection System. Failure of the cladding on the aluminium rods results in contamination of the coolant on contact with the uranium.

Although this failure is detected on a graph in the control room, its excat location has to be checked by physical intervention. Such incidents are reported on practically every alternate shift. Organising resistance to this risk negligence of which violates international safety norms, led to the suspension of Chacko Jacob, the general secretary of the association.

Radioactive water was found leaking from a corroded pipeline between Cirus and Effluent Treatment Plant. The leakage was however discovered only after another pipe carrying sea water got ruptured, and contract labourers were brought in to dig the area. Reactor operators reported high radiation contamination of their clothes detected by monitors, thus drawing attention of RHC to the source. They found the radiation background to be 10 millirem per hour, it was reported. The association said it was not aware of measures to decontaminate the contract labourers, or efforts to trace where the excavated soil in that area has been dumped. AERB confirmed that the incident occured in December 1991, and said that "the exposure of contract workers was well within the stipulated limits."

Association members said they were concerned about the plight of maintainance workers, who are not educated about the dangers they face, and are operating without close supervision of the RHC. They cited instance of such workers operating in high radioactivity areas.

Recently, a heavy water spillage flooded the basement and reactor hall, and maintanance staff had to physically mop the area, it was alleged. Confirming this incident, AERB said in April-May 1991 that there was "a minor heavy water spillage. The maximum radiation exposure received by personnel during this work was less than 2 per cent of the limit stipulated by AERB."

*Rupa Chinai*

*The Sunday Observer 21.6.1992*

## Subscription Rates:

Rs. 25/- per year South Asia
U.S.$ 15/- per year or equivalent in other convertible currencies (airmail overseas)
(Rs.300/- per year if paid for in India)
Rs.250/- for life (only within India)
Please add Rs.6/- for cheques
Drafts should be drawn on State Bank of India, Valod (0531)

Anumukti Team: P.P.Baburaj, Sanghamitra and Surendra Gadekar

Subscriptions, donations, manuscripts, inquiries regarding circulation, etc. should all be addressed to:

Anumukti
Sampoorna Kranti Vidyalaya
Vedchhi, Dist:Surat, 394641 INDIA

Please do not send cheques or drafts addressed to Surendra Gadekar

Published by S.Gadekar for Sampoorna Kranti Vidyalaya and printed at The Parijat Printry. Ahemedabad

**PRINTED MATTER** **BOOKPOST**